

LIGHTING EFFICIENCY TECHNOLOGY REPORT

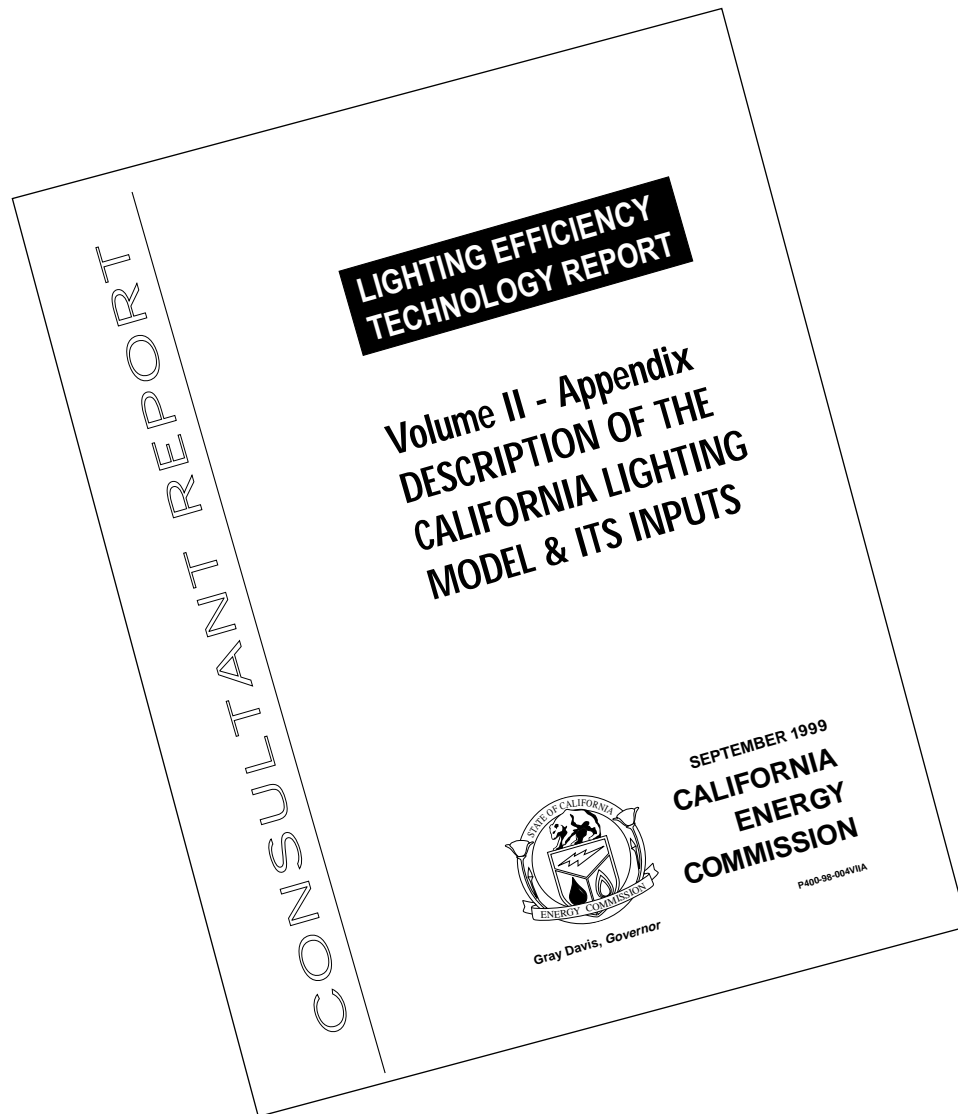
Volume II - Appendix DESCRIPTION OF THE CALIFORNIA LIGHTING MODEL & ITS INPUTS



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CALIFORNIA
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CALIFORNIA ENERGY COMMISSION

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5. APPENDICES

5.1 Appendix A: California Lighting Model

The California Lighting Model (CLM) is a tool to evaluate and compare alternative lighting efficiency policy options in California. It provides a means to quantify lighting energy use on the basis of building type, space type, lighting application, fixture type, lamp/ballast type and control type. It calculates the baseline lighting energy use for these parameters and projects them up to statewide estimates. It uses average values generated from comprehensive survey data on existing lighting characteristics and energy use, and on numbers and types of buildings.

Furthermore, the CLM is also able to forecast lighting energy use out for the next 15 years. Changes in technologies, market penetration, and design practices can be simulated over time, and applied to projected changes in new and existing building stocks. In examining lighting efficiency options, any of these parameters can be adjusted, and the resulting lighting energy use differences calculated.

The CLM is built using a relational database structure with the Microsoft Access computer program. This structure allows the model to be efficiently manipulated to correspond to various policy scenarios, and so to calculate the energy differences between them. The structure of the model determines the analysis options and capabilities available for the study.

The database uses a series of tables to hold the basic data about lamps, fixtures and other aspects of lighting use. These data tables are connected by links tables. The values in these links tables can be adjusted in each of the lighting scenarios to analyze policy options. The following sections describe the data and links tables with which the model is built.

This section describes the development and characteristics of the CLM. It also identifies the sources of data used to build the model and the steps that were taken to adapt that data to the purpose. The CLM was used to examine a wide range of scenarios for change in statewide lighting use and equipment.

5.1.1 Residential Model

This discussion covers the development of the baseline scenario for residential lighting energy use. The commercial lighting model is discussed in the following section, Section 5.1.2.

The general organization of the residential database is shown in Figure 5-1. It shows the major data tables and their relationships. Also shown are the various types of links between the tables. A conventional relationship is a “one-to-many” relationship; for example, each forecast includes links to many different building types. A matrix relationship is a “many-to-many” relationship that generally specifies the saturations or shares of one type of data to another; for example, different types of applications have different saturations in different types of spaces. Furthermore, some of these matrix relationships vary depending on the scenario.

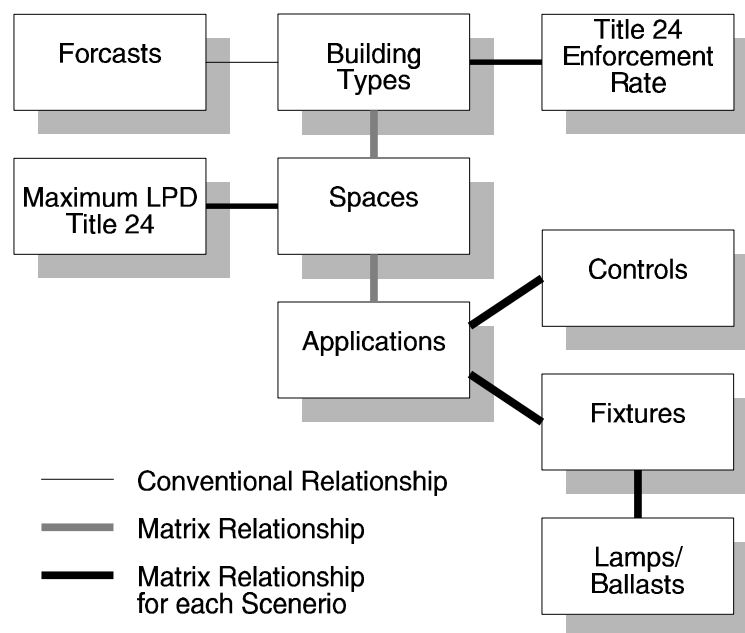


Figure 5-1 - California Lighting Model Structure

The types of data included in each of these tables are listed in the following section. Then the nature of the data in the links tables that specify the relationships between the main tables is described.

Main Tables and Link Tables

The main tables consist of

<u>Table Name</u>	<u>Associated Data</u>
Building Types	type names and ID
Spaces (room) Types	type names and ID
Application Types	Average Hours year, Average lumens, type names and ID
Fixtures (luminaires) Types	type names and ID
Lamps/Ballasts Types	Efficacy per lamp type type names and ID
Control Types	% Watts and % Hours per Control Type type names and ID

The definitions for the records in each of these tables are given briefly in the body of the report, and in more detail in the model inputs section. Each record in a table is assigned an ID number in addition to its name, such that for the residential model the building type and space tables are as follows:

Building Types Table:

ID Name

- 1 Single Family
- 2 Multiple Family

Spaces Table:

ID Name

- 39 Bath
- 40 Bedroom
- 41 Den
- 42 Hall
- 43 Kitch/Dine
- 44 Living
- 45 Garage
- 46 Utility
- 47 Yard

The links tables contain relationships between the records of the main tables.

The links tables are:

<u>Table Name</u>	<u>Data Type</u>
Space Type to Building Type	Saturation
Application Type to Space Type	Saturation
Fixture Type to Application Type	Lumen Share
Control Type to Application Type	Watt Share, % Hours, % Watts
Lamp Type to Fixture TypeLumen	Lumen Share

Saturation refers to the average number of occurrences per parent type. For example the link between the Building Types Table and the Space Types Table contains saturations, or the average number of occurrences of each room type per household type, as follows:

<u>Space Type</u>	<u>Single Family</u>	<u>Multifamily</u>
Bedroom	2.64	1.62
Bathroom	2.04	1.42
Kitch/Dine	1.72	1.64
Living	1.25	0.96
Den	0.39	0.11
Hall	1.54	0.94
Utility	1.37	0.50
Garage	0.74	0.12
Yard	2.31	0.97

Share refers to the percentage market share of a technology for a parent type. Market Shares can be calculated based on percentage of items, percentage of watts, or percentage of lumens.

Shares always sum to one for each parent type. For example, a partial list of the values for the Control Type to Applications Types links table shows the market share of control types for the Wall Mounted Garage application:

<u>Control Type</u>	<u>Market Share (Watts)</u>
Dimmer	0.00626
Motion Detector-Single	0.06760
Photo Cell-Outdoor	0.01869
On/Off Switch	0.88416
Timer	0.02328
All Controls for Wall/Garage	1.00000

The values for each link relationship are calculated from the survey data for that particular bilateral relationship, independent of the other variables. For example the market share of timers for wall mounted garage applications is for all wall mounted garage fixtures, regardless if they are a barn, lantern or flood type fixture, in both single family and multifamily households, and independent of lamp type.

These values input into the baseline scenario of the CLM are available in the model inputs section of this appendix. Please note that they are *averages* for each bilateral relationship, as derived from the weighted master dataset. They differ from the baseline analysis presented earlier in this report, which is based on a *summation* of the values of all individual records in the master dataset, weighted to the statewide population.

Residential Lumen Efficacies

Since the California Lighting Model is based on exchanging lumen equivalent shares of technologies, these are normalized by using a set of assumed efficacies for each defined group of the lamp/ballast technologies. We used efficacies derived from “mean lumen output” at 40% of lamp life, to account to variation in the longevity of the various technologies. These are different than the initial lumen output values more typically used. We used the efficacy for the most common technology within the group. Thus, if 40 Watt incandescents are the most common bulb within the 1-50W incandescent technology group, then the efficacy was derived from that specific technology. The residential efficacies used in the model are presented below in Figure 5-2.

<u>Lamp Type</u>	<u>Assumed Ballast</u>	<u>Lumens/Watt</u>	<u>Avg Wattage (observed)</u>
1. 0W Incand	None	0	0
2. 1-50W incand.	NONE	11	32
3. 51-100W incand.	NONE	14	73
4. 101-150W incand	NONE	14	147
5. 151+W incand	NONE	17	217
6. 0W Fluor	STD	0	0
7. 1-19W FL1	STD	38	15
8. 20-30W FL	STD	45	22
9. 31+W FL	STD	58	43
10. 0 W Halo	None	0	0
11. 1-50 W Halo	NONE	15	43
12. 51-150 W Halo	NONE	17	99
13. 151+W Halo (quartz)	NONE	21	301
14. 0W HID	STD	0	0
15. 1-150W HID	STD	50	64
16. 151W+ HID	STD	52	181
17. 0W Other	None	0	0
18. 1-100W Other	None	50	54
19. 100+W Other	None	52	204

Figure 5-2 - Residential Efficacy Inputs

CLM Algorithm

The residential California Lighting Model (CLM) uses the algorithm shown below in Figure 5-3 to calculate Statewide Residential Lighting Energy Use per forecast year. An example is given for one path through the database, using only one example record from each of the main tables. The total statewide energy use is the sum of all paths, for all records.

Example

 [# of Households	per	 Building Type]	7.15M Single Family homes, 1995
	X		
 [# of Spaces	per	 Household Type]	1.25 Living Rooms/SF home
	X		
 [# of Applications	per	 Space Type]	.28 Floor Lamps/Living room
	X		
 [Avg. Hrs./yr	per	 Application]	2.56 hrs/day * 365 days/yr
	X		
 [Watt Share of Control	per	 Application Type]	.09 dimmers/Lv Floor Lamps
	X		
 [% Watts reduction	per	 Control Type]	80% Watts/dimmer
	X		
 [% of Hours	per	 Control Type]	92% Hours/dimmer
	X		
 [Average Lumens	per	 Application Type]	4,500 Lumens/Lv Rm Floor Lamps
	X		
 [Lumen Share of Fixt.	per	 Application Type]	.25 Torchiers/LV Rm Floor Lamps
	X		
 [Lumen Share of Lamp	per	 Fixture Type]	.33 Halogen-3 lamps/Torchiers
	X		
 1/[Efficacy	per	 Lamp Type]	1 Watts/15 Lumen/Halogen-3

= Statewide energy use for torchier type floor lamps using Halogen-3 lamps (151+Watts) in single family living rooms.

Figure 5-3 - CLM Residential Algorithm

CLM User Interface

The CLM is implemented as a Microsoft Access database with a menu-driven user interface.

The Main Menu, shown in Figure 5-4 starts whenever the database is opened and from here, a user can open the Scenario Editor, Building Type Editor or the Forecast Editor.

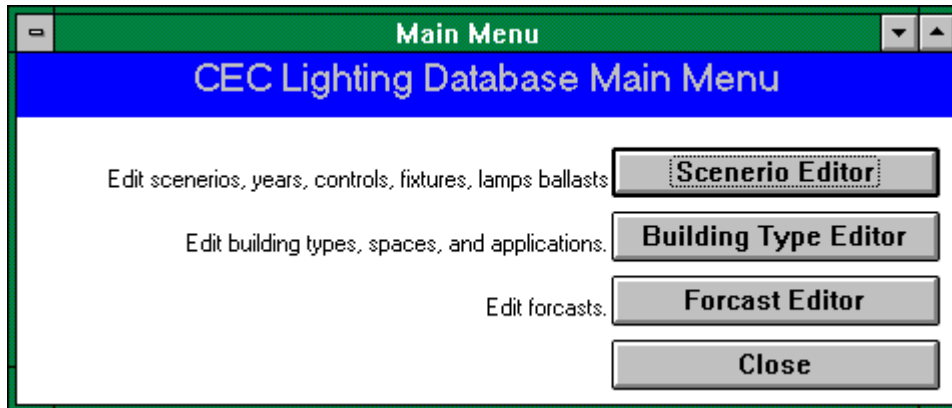


Figure 5-4 - CLM Main Menu Screen

The Scenario Editor, shown in Figure 5-5, creates and edits the controls, fixtures and lamps/ballasts that belongs to a particular year and application of a scenario. The menus for this window are :

<u>F</u> ile	<u>E</u> dit	<u>C</u> opy New	<u>D</u> elete	<u>B</u> alance
Check All Links	Control Types...	Scenario	Scenario	Controls
Main Menu	Fixture Types ...	Year	Year	Fixtures
Building Types Editor	Lamps/Ballast Types ...			Lamps/Ballasts
Forecast Editor				
Close Window				

Scenario Editor

Scenario:
 Basecase

Application:
 Ceiling, recessed cans

Year:
 1/1/96

Scenario details:
 ID: 2
 Name: Basecase
 Description: This is the base case (default) scenario, which all other scenarios are copied from.
 Cost: 100.00
 LCC: 10

Controls: 0.128

Manual	0.51
Light Sensors	0.158
Occupancy Sensors	0.128
Dimming	0.102
Timeclock	0.102

Fixtures: 0.577

Ceiling can, medium bas	0.423
Ceiling can, MR-16	0.577

Lamps/Ballasts: 0.31

T12 Elect.	0.69
T8 Elect.	0.31

Control types:

- Manual
- Timeclock
- Occupancy Sensors
- Light Sensors
- Dimming

Fixture types:

- Ceiling can, medium bas
- Ceiling can, MR-16
- Ceiling can, low-voltage
- Ceiling can, CF
- Ceiling, small, medium b
- Ceiling, small, CF

Lamps/Ballasts types:

- T12 Mag. ES
- T8 Mag. ES
- T5 Mag. ES
- T12 Elect.
- T8 Elect.
- T5 Elect.

Exit

Figure 5-5 - CLM Scenario Editor Screen

The Building Types Editor, shown in Figure 5-6, lets users edit the applications and spaces that belong to a building type. The menus for the Building Types Editor are:

<u>F</u> ile	<u>E</u> dit	<u>B</u> alance
Check All Links	Building Types ...	Spaces
Main Menu	Spaces ...	Applications
Scenario Editor	Applications ...	
Forecast Editor		
Close Window		

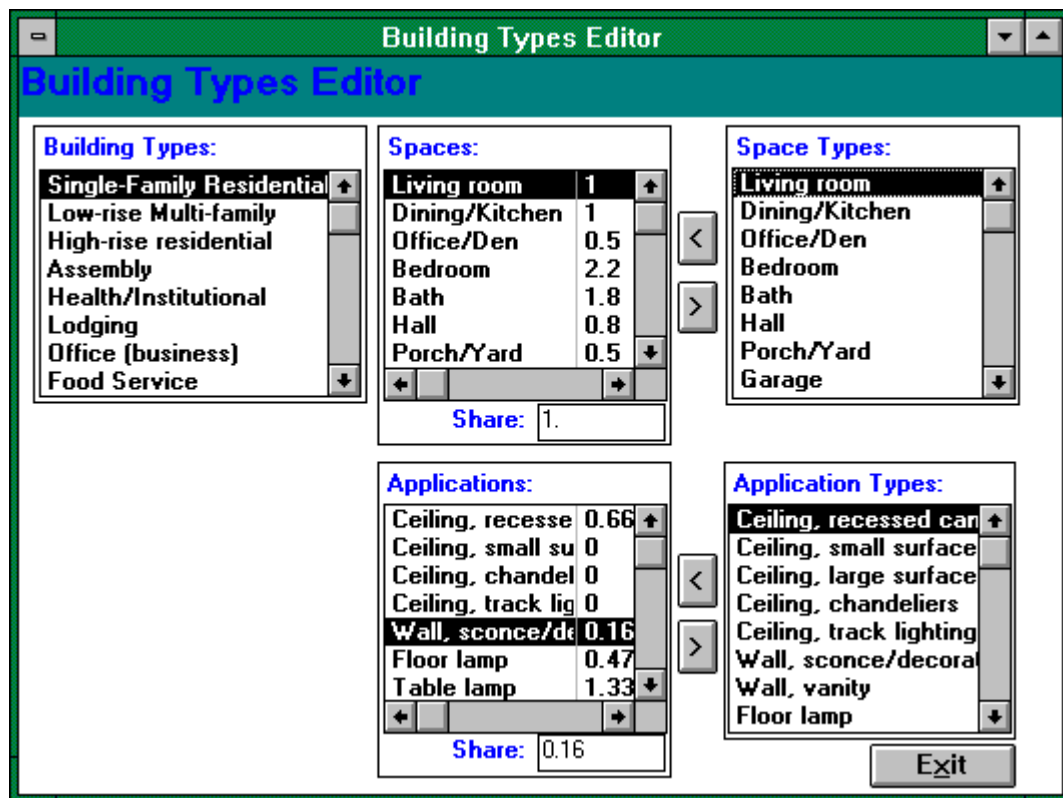


Figure 5-6 - CLM Building Types Editor Screen

The Forecast Editor, shown in Figure 5-7, edits the forecast years that belong to a building type and service territory. The menus for the Forecast Editor are:

<u>F</u> ile	<u>E</u> dit
Main Menu	Add New Forecast
Scenario Editor	Delete Forecast
Building Types Editor	
Close Window	

Forecast Editor

Forecasts Editor

Building Types: Single-Family Residential

Service Territory: California

Forecasts: 1997, 1998, 1999, 2000

Year: 1998

Existing Forecast: 10.7

New Forecast: 20.3

Exit

Record: 1

Figure 5-7 - CLM Forecast Editor Screen

5.1.2 Commercial Model

The lighting characteristics data from the commercial buildings described in Volume I were analyzed and used to create the baseline conditions for the commercial version of the California Lighting Model. For each space type, average hours of operation and average “mean output lumens” were calculated from the survey data. “Mean output lumens” were defined as the lamp/ballast lumen output at the mean life of the lamps, based on the inventory of lighting technologies found within that space type, and using the efficacy assumptions listed in the Lamp Type table on pages 15 and 16.

“Lumen shares” were then calculated for each lamp and ballast type found within those space types. A lumen share was defined as the proportion of “mean output lumens” provided by a given technology to that space type. Each technology was also assigned an efficacy to translate lumens back into Watts. From this structure, statewide lighting energy use and statewide installed lighting Watts were calculated.

This analysis is based on CEC forecasts of SF by building type, and CEUS data on the percentage of space types by building types, full time equivalent (FTE) hours by building type by space type, and market share of technologies by % lumens. It requires summing the total lumens contributed by each lamp/ballast combo in each model table category, from space type on down to lamp/ballast type, and then calculating the market share by percent of lumens contributed by each sub category (i.e. percent of hallway lumens contributed by 4’FL lamps, summing lumens from all 4’FL lamp/ballast combos).

The commercial CLM model did not make use of fixture types or luminaire categories. Information on luminaire types in the CEUS data was incomplete and judged to be not very informative, and possibly unreliable. For example, luminaire types included surface and recessed mounted, but did not include pendant or wall mounted. A taxonomy of fixture types by space and lamp type was developed for analysis, but too many fixture types had low statistical representation, making the analysis very weak. It was concluded that the analysis would be strongest without using any fixture types to further subdivide the data.

An alternative “technology group” was created to define basic lamp technologies that could be manipulated in the model to group changes in lamp type per space type and ballasts types per lamp type. See the descriptions below.

Building Types Table

Ten building types were identified, based on CEC forecast categories:

- | | |
|-------------------|---|
| 1. Small Office | less than 50,000 SF |
| 2. Large Office | more than 50,000 SF |
| 3. Restaurant | incl. fast food and sit down |
| 4. Retail | incl. Small Retail, Large Retail |
| 5. Food Store | incl. Grocery, Convenience Store |
| 6. Warehouse | incl. Warehouse, Refrigerated Warehouse |
| 7. School | incl. K-5 & College |
| 8. Health | incl. inpatient and outpatient |
| 9. Lodging | incl. Hotels & Nursing Home |
| 10. Miscellaneous | incl. Non-Building & Church |

Data is square footage in the statewide population.

Spaces Table

We collapsed 26 CEUS space types into 14 types. These are based on those space categories with a significant (>1%) representation of total commercial square footage, and similarity of lighting conditions, as determined by the project team.

ID	Code	Room types included
1.	Off	Office/Conference, Library
2.	Hall	Hallway/Lobby/Stair
3.	Ret	Retail
4.	Dine	Dining Room
5.	Cook	Cooking
6.	Tech	Technical Area: Medical Care Area, Laboratory, Operating Rm
7.	Clas	Classroom
8.	Pub	Public Assembly, Gymnasium
9.	Lodg	Lodging: Hotel Room, Patient Room
10.	Stor-c	Storage, Conditioned
11.	Stor-u	Storage, Unconditioned
12.	Ind	Industrial Processing, conditioned & unconditioned
13.	Misc-c	Misc. Conditioned, Vacant Conditioned, Repair Conditioned, Refrigerated Storage,
14.	Misc-u	Misc. Unconditioned, Vacant Unconditioned

Space types have values of % of SF for each building type, and also total lumens per square foot, independent of the building type. Total lumens was summed from total watts for all lamp/ballast combos represented in the base case data sets times the defined lumen efficacy for each lamp/ballast combo. Both SF and lumen share values, and a third value, full time equivalent hours (FTE hrs) by space type by building type, were all derived from the CEUS data.

Technology Group

The technology groups are basic lamps types. This allows us to assign market share, based on percentage of total space lumens in the base case, to various lamp technologies. Later, in scenarios, the user can switch market share between technology types within a given space type, or switch ballast types within a technology group. Technology types are assigned lumen shares per space type.

	Code	Wattage	Description
1.	CFL1	1-19 watts	small compact fluorescents
2.	CFL2	20-30W	large compact fluorescents, circline and T5 twin
3.	FFL1	31-40W	standard 4' fluorescents and some large CFL
4.	FFL2	41+ W	HO 4' and any fluorescent longer than a 4'
5.	IN1	1-100 W	all small incandescents and tungsten halogen
6.	IN2	101-249W	all large incandescents and tungsten halogen
7.	IN3	250+W	all very large incandescents and tungsten halogen
8.	HID1	1-150W	all small HID (MV, MH, HPS)
9.	HID2	151+ W	all large HID
10.	OTH	ANY	all other (neon, unknown, other)

Ballast Types

The ballast types are specific to a technology group. Ballast types allow a shift in market share of ballast type within a technology group, but independent of lamp type. Thus, a scenario can be created where the market share of fluorescent electronic dimming ballasts can increase independent of the specific lamps used. Ballast types have a lumen share per technology type.

	<u>Code</u>	<u>Wattage</u>	<u>Description</u>
1.	CFL STD	(1-30W)	magnetic CFL
2.	CFL ELC	(1-30W)	electronic CFL
3.	CFL DIM*	(1-30W)	dimming electronic CFL
4.	FFL1 STD	(31-40W)	standard 4' ballasts
5.	FFL1 HE	(31-40W)	high efficiency magnetic and/or hybrid
6.	FFL1 ELC	(31-40W)	electronic 4'
7.	FFL1 DIM*	(31-40W)	dimming electronic 4'
8.	FFL2 STD	(41+W)	standard 6-8'
9.	FFL2 HE	(41+W)	high efficiency 6-8' magnetic and/or hybrid
10.	FFL2 ELC	(41+W)	electronic 6-8'
11.	FFL2 DIM*	(41+W)	dimming electronic 6-8'
12.	INCAND	ANY	all incandescent, all tungsten halogen, all quartz
13.	HID STD	ANY	standard magnetic ballast for any HID
14.	HID HE*	ANY	high efficiency or hybrid HID ballast
15.	HID ELC*	ANY	electronic HID ballast
16.	HID DIM*	ANY	dimming electronic HID ballast
17.	OTHER	ANY	all other

Lamps

Lamps are divided into wattage bins that allow greater precision in identifying the type, and greater precision in assigned lumen efficacy (lumens/watt) values to lamp/ballast combos. Mean luminous efficacy was derived from published catalog data on representative lamp-ballast combinations. These values were defined to be representative mean output lumens/watt values for each lamp/ballast group. Comparisons to previously published values of initial output lumens is cautioned.

Lamp types have a lumen share per ballast type.

Lamp type and wattage	Ballast type	Lumens/Watt
Fluorescent		
1. 1-19W	STD	38
2. 1-19W	ELC	51
3. 20-30w	STD	45
4. 20-30w	ELC	53
5. 20-30w	DIM	47
6. 32W	HE	70
7. 32W	ELC	78
8. 32W	DIM	75
9. 34W	STD	50
10. 34W	HE	56
11. 34W	ELC	66
12. 34W	DIM	66
13. 40W	STD	58
14. 40W	HE	64
15. 40W	ELC	70
16. 40W	DIM	70
17. OTHER 31-40W	STD	55
18. OTHER 31-40W	ELC	59
19. OTHER 31-40W	HE	64
20. OTHER 31-40W	DIM	61
21. 41-95W	STD	56
22. 41-95W	HE	62
23. 41-95W	ELC	70
24. 96+W	STD	63
25. 96+W	HE	66
26. 96+W	ELC	69

Lamp type and wattage	Ballast type	Lumens/Watt
<u>Incandescent</u>		
1. 1-50W incand.	NONE	11
2. 51-100W incand.	NONE	14
3. 101-150W incand	NONE	14
4. 151+W incand	NONE	17
5. 1-150 W T-H	NONE	15
6. 151-249 W T-H	NONE	15
7. 249+W T-H (quartz)	NONE	21
<u>HID and Other, all other</u>		
8. 1-150W MH	STD	50
9. 151W+ MH	STD	52
10. 151W+ MH	HE	75
11. 1-150 W HPS	STD	66
12. 151+ W HPS	STD	98
13. Low Press. Sodium	STD	67
14. Mercury Vapor	STD	36
15. Neon	generic	40
16. All other	W.A.G.	15

Control Types

Six control types were identified from the CEUS data. The market share (%lumens) of each control type was calculated, shown below in Figure 5-8. It was determined by interviewing the original surveyors who collected the CEUS data that the reported FTE hours by space type already accounted for the impact of any controls present in the surveyed space. Thus, no additional control correction was applied to the base case data.

Correction factors for percent of FTE hours and power use were postulated for each control type by space type, based on monitored studies and professional experience, shown below in Figure 5-8. These factors were applied for any scenario proposing to use a given control type.

Control Strategies (defined from the data)

1. On/Off
2. Occupancy Sensor
3. Dimmer
4. Photocell
5. Time Clock
6. EMS

Baseline Commercial Market Share

Space type	Office	Hall	Retail	Dine	Cook	Tech	Class	Public	Lodging	Storage-C	Storage-U	Industrial	Misc-C	Misc-U
1 ON/OFF SWITCH	66.3	37.8	59.1	54.5	77.8	86.7	53.9	91.7	99.5	55	91.7	82.7	90.2	52.1
2 SENSOR	12.9	1.2	0.3	41.7	18.9	11	43.7			3.3	0	9.7	1.5	0
3 DIMMER	0.8	0		1	0	0.4	2.4	1.3	0			0.1	0.6	0
4 PHOTOCCELL	0	0	0									1.9	1.6	1.9
5 TIME CLOCK	5.8	32.6	17.4	1.7	0.3	1.9	0	6.1	0.5	9	1.1	5.5	5	3.7
6 EMS	14.3	28.4	23.2	1.1	2.9			0.9		32.7	7.1	0	1	42.3

Time correction factor

Space type	Office	Hall	Retail	Dine	Cook	Tech	Class	Public	Lodging	Storage-C	Storage-U	Industrial	Misc-C	Misc-U
1 ON/OFF SWITCH	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2 SENSOR	90%	95%	100%	100%	100%	90%	85%	80%	70%	70%	70%	100%	90%	90%
3 DIMMER	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4 PHOTOCCELL	90%	95%	98%	90%	100%	98%	80%	100%	100%	100%	80%	80%	90%	90%
5 TIME CLOCK	95%	85%	90%	100%	100%	100%	95%	100%	100%	95%	95%	95%	100%	100%
6 EMS	95%	85%	90%	100%	100%	100%	95%	100%	100%	95%	95%	95%	100%	100%

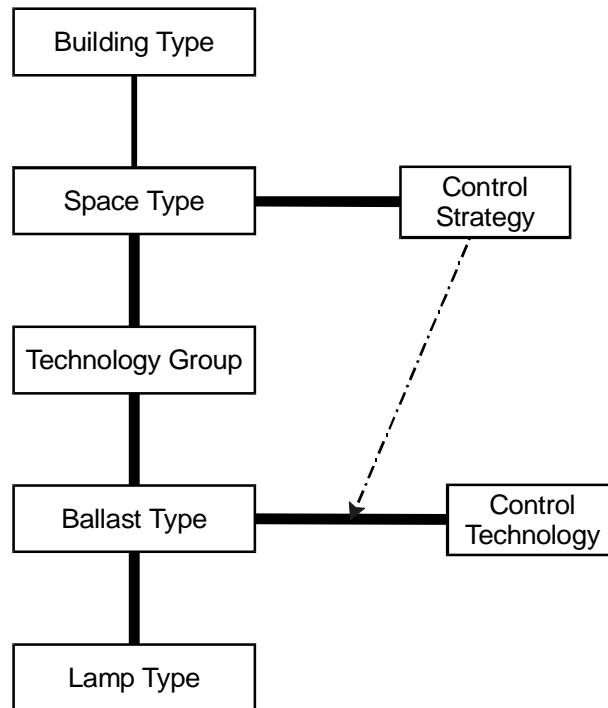
Power correction factor

Ballast type	CFL STD	CFL ELC	FFL1 STD	FFL1 HE	FFL1 ELC	FFL2 STD	FFL2 HE	FFL2 ELC	INCAND	HID STD	HID HE	OTHER
1 ON/OFF SWITCH	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2 SENSOR	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3 DIMMER	100%	80%	100%	100%	80%	100%	100%	80%	80%	100%	80%	80%
4 PHOTOCCELL	100%	80%	100%	100%	80%	100%	100%	80%	80%	100%	80%	80%
5 TIME CLOCK	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
6 EMS	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 5-8 - Control Type Correction Factors

Logic diagram

The logic diagram for the various tables and their relationship is illustrated below in Figure 5-9.



Key:

— Fixed Relationship

— Market Share, variable in model scenarios

.....> Logic Table, limits choices in associated Market Share links table

Figure 5-9 - Logic Diagram for Commercial Model Tables

Commercial CLM Algorithm

The Commercial California Lighting Model (CLM-C) uses the following algorithm shown below to calculate Statewide Commercial Lighting Energy Use per forecast year. An example is given for one path through the database, using only one example record from each of the main tables. The total statewide energy use is the sum of all paths, for all records.

Example

[# of SF	per	Building Type]	50M SF large offices , 1995
	X		
{FTE hours	per	Building type}	5700 hrs/yr office buildings
	X		
[%SF of Space type	per	Building Type]	3% Hallways/large offices
	X		
{total lumens/SF	per	Space type}	70lumens/SF for hallways
	X		
{% FTE of building	per	Space type}	1.15% FTE for hallways
	X		
[%lumens of Tech. Grp	per	Space Type]	70% 4'FL lumens/hallways
	X		
[% market share ballasts	per	tech grp]	40% ELC ballast/4'FL.
	X		
[% market share lamps	per	ballast]	80% 32W FL/ELC ballasts
	□	note! Division!	
[luminous efficacy	per	lamp/ballast combo]	85 lumens/watt T8/ELC
	X		
[% market share Space	per	Control Strategy]	10% hallway lumens/ dimming
	X		
[% space type FTE hrs	per	Control Strategy]	100% hallway hrs/ dimming
	X		
[% market share Control	per	Ballast Type]	10% FFLELC/ dimming
	X		
[% ballast. Watts	per	Control Technology]	85% FFLELC / dimming controls
= Statewide energy use for T8/ELC lamps on dimmers for hallways in large office buildings.			

5.2 Appendix B: Residential Model Inputs

Modeling data inputs derived from SCE Inventory and TPU monitored data, using lumen market shares. File name "Model5." 11/16/96

Notes: All values for HITS, and FIXTURE are in Thousands (000's)

All values for WATTS and LUMENS are in Millions (Gigawatts)

VARIABLE DEFINITIONS

APPL - APPLICATION TYPE
 FIXTURE - NUMBER OF FIXTURES
 SWITCH - FIXTURE CONTROL TYPE
 HITS - HOUSEHOLDS HAVING ITEM
 PROP_L - PROPORTION OF LUMENS
 PROP_W - PROPORTION OF TOTAL WATTS
 ALUMEN - AVERAGE WATTS PER LAMP GROUP
 WATTS - TOTAL WATTS
 PROP_B - PROPORTION OF BULBS
 LAMPG - LAMPG GROUP
 FIX - FIXTURE GROUP

MAIN TABLES ID DEFINITIONS/REDEFINITIONS

APPLICATIONS

1 = CEILING SURFACE/ATTIC
 2 = CEILING SURFACE/BATHROOM
 3 = CEILING SURFACE/BEDROOM
 4 = CEILING SURFACE/GARAGE
 5 = CEILING SURFACE/HALL
 6 = CEILING SURFACE/KITCHEN-DINING
 7 = CEILING SURFACE/LIVING
 17 = CEILING /YARD
 8 = CEILING RECESSED/BATHROOM
 9 = CEILING RECESSED/HALL
 10 = CEILING RECESSED/KITCHEN-DINING
 11 = CEILING RECESSED/LIVING
 26 = FLOOR/BEDROOM
 27 = FLOOR/LIVING
 12 = CEILING SUSPENDED/BEDROOM
 13 = CEILING SUSPENDED/GARAGE
 14 = CEILING SUSPENDED/KITCHEN-DINING
 15 = CEILING SUSPENDED/LIVING
 16 = CEILING SUSPENDED/ATTIC
 23 = TABLE/BEDROOM
 24 = TABLE/FAMILY
 25 = TABLE/LIVING
 28 = UNDER/KITCHEN-DINING
 18 = WALL/ATTIC
 19 = WALL/BATHROOM
 20 = WALL/BEDROOM
 21 = WALL/GARAGE
 22 = WALL/YARD
 29 = OTHER/INSIDE
 30 = OTHER/YARD

FIXTURES TABLE

- 1 = CEILING RECESSED CANS
- 2 = CEILING RECESSED TROFFERS
- 3 = CEILING SURFACE DECORATIVE
- 4 = CEILING SURFACE KITCHEN
- 5 = CEILING SURFACE TRACK
- 6 = CEILING SUSPENDED PENDANT
- 7 = CEILING SUSPENDED CHANDELIER
- 8 = WALL SCONCE
- 9 = WALL VANITY
- 10 = UNDER CABINET
- 11 = TABLE LAMP SMALL
- 12 = TABLE LAMP LARGE
- 13 = FLOOR LAMP TORCHIER
- 14 = FLOOR LAMP TRADITIONAL
- 15 = FLOOR LAMP TASK
- 16 = OTHER INDOOR
- 17 = OUTDOOR CEILING
- 18 = OUTDOOR WALL FLOOD
- 19 = OUTDOOR WALL LANTERN
- 20 = OUTDOOR WALL BARN
- 21 = OTHER OUTDOOR

CONTROLS TABLE

- 1 = DIMMER
- 2 = MOTION D SINGLE
- 3 = MOTION D MULTI
- 4 = MOTION D YARD
- 5 = PHOTO CELL OUTDOOR
- 6 = PHOTO CELL OTHER
- 7 = SIMPLE ON/OFF
- 8 = SCHEDULER YARD
- 9 = SCHEDULER INDOOR
- 10 = TIMER
- 11 = 3-WAY LOW
- 12 = 3-WAY HIGH

LAMP/BALLAST TABLE

- 1 = INCAN 0 W
- 2 = INCAN 1-50 W
- 3 = INCAN 51-100 W
- 4 = INCAN 101-150 W
- 5 = INCAN 151+ W
- 6 = FLUOR 0 W
- 7 = FLUOR 1-19 W
- 8 = FLUOR 20-30 W
- 9 = FLUOR 31+ W
- 10 = HALOG 0 W
- 11 = HALOG 1-50 W
- 12 = HALOG 51-150 W
- 13 = HALOG 151+ W
- 14 = HID 0 W
- 15 = HID 1-100 W
- 16 = HID 101+ W
- 17 = OTHER 0 W
- 18 = OTHER 1-100 W
- 19 = OTHER 101+ W

SPACES TABLE

- 39 = BATHROOM
- 40 = BEDROOM
- 41 = FAMILY-DEN-OFFICE
- 42 = HALL
- 43 = KITCHEN/DINING
- 44 = LIVING ROOM
- 45 = GARAGE

46 = OTHER
47 = YARD

APPLICATIONS AVERAGE LUMEN FILE LISTING

OBS	APPL	ALUMEN	APP
1	1	2157.41	CEILING SURFACE/ATTIC
2	2	2010.87	CEILING SURFACE/BATHROOM
3	3	2827.22	CEILING SURFACE/BEDROOM
4	4	6097.64	CEILING SURFACE/GARAGE
5	5	1370.76	CEILING SURFACE/HALL
6	6	2908.04	CEILING SURFACE/KITCHEN-DINING
7	7	2273.58	CEILING SURFACE/LIVING
8	8	6367.37	CEILING RECESSED/BATHROOM
9	9	2086.27	CEILING RECESSED/HALL
10	10	8648.09	CEILING RECESSED/KITCHEN-DINING
11	11	5098.87	CEILING RECESSED/LIVING
12	12	2369.10	CEILING SUSPENDED/BEDROOM
13	13	8803.54	CEILING SUSPENDED/GARAGE
14	14	2663.19	CEILING SUSPENDED/KITCHEN-DINING
15	15	2085.85	CEILING SUSPENDED/LIVING
16	16	2889.77	CEILING SUSPENDED/ATTIC
17	17	2643.71	CEILING /YARD
18	18	1815.51	WALL/ATTIC
19	19	3121.42	WALL/BATHROOM
20	20	1867.73	WALL/BEDROOM
21	21	1504.31	WALL/GARAGE
22	22	3215.47	WALL/YARD
23	23	2945.68	TABLE/BEDROOM
24	24	2093.36	TABLE/FAMILY
25	25	2488.01	TABLE/LIVING
26	26	2577.84	FLOOR/BEDROOM
27	27	2634.12	FLOOR/LIVING
28	28	980.99	UNDER/KITCHEN-DINING
29	29	2379.83	OTHER/INSIDE
30	30	2636.34	OTHER/YARD

APPLICATIONS AND FIXTURES LINK FILE LISTING

OBS	APPL	FIX	PROP_L	APP	FX
1	1	3	1.00000	CEILING SURFACE/ATTIC	CEILING SURFACE DECORATIVE
2	2	3	0.34429	CEILING SURFACE/BATHROOM	CEILING SURFACE DECORATIVE
3	2	5	0.65571	CEILING SURFACE/BATHROOM	CEILING SURFACE TRACK
4	3	3	1.00000	CEILING SURFACE/BEDROOM	CEILING SURFACE DECORATIVE
5	4	3	1.00000	CEILING SURFACE/GARAGE	CEILING SURFACE DECORATIVE
6	5	3	0.08139	CEILING SURFACE/HALL	CEILING SURFACE DECORATIVE
7	5	5	0.91861	CEILING SURFACE/HALL	CEILING SURFACE TRACK
8	6	4	0.46084	CEILING SURFACE/KITCHEN-DINING	CEILING SURFACE KITCHEN
9	6	5	0.53916	CEILING SURFACE/KITCHEN-DINING	CEILING SURFACE TRACK
10	7	3	0.25526	CEILING SURFACE/LIVING	CEILING SURFACE DECORATIVE
11	7	5	0.74474	CEILING SURFACE/LIVING	CEILING SURFACE TRACK
12	8	1	0.57547	CEILING RECESSED/BATHROOM	CEILING RECESSED CANS
13	8	2	0.42453	CEILING RECESSED/BATHROOM	CEILING RECESSED TROFFERS
14	9	1	0.95937	CEILING RECESSED/HALL	CEILING RECESSED CANS
15	9	2	0.04063	CEILING RECESSED/HALL	CEILING RECESSED TROFFERS
16	10	1	0.16021	CEILING RECESSED/KITCHEN-DINING	CEILING RECESSED CANS
17	10	2	0.83979	CEILING RECESSED/KITCHEN-DINING	CEILING RECESSED TROFFERS
18	11	1	0.81018	CEILING RECESSED/LIVING	CEILING RECESSED CANS
19	11	2	0.18982	CEILING RECESSED/LIVING	CEILING RECESSED TROFFERS
20	12	6	0.47629	CEILING SUSPENDED/BEDROOM	CEILING SUSPENDED PENDANT
21	12	7	0.52371	CEILING SUSPENDED/BEDROOM	CEILING SUSPENDED CHANDELIER
22	13	6	1.00000	CEILING SUSPENDED/GARAGE	CEILING SUSPENDED PENDANT
23	14	6	0.26180	CEILING SUSPENDED/KITCHEN-DINING	CEILING SUSPENDED PENDANT
24	14	7	0.73820	CEILING SUSPENDED/KITCHEN-DINING	CEILING SUSPENDED CHANDELIER
25	15	6	0.34793	CEILING SUSPENDED/LIVING	CEILING SUSPENDED PENDANT
26	15	7	0.65207	CEILING SUSPENDED/LIVING	CEILING SUSPENDED CHANDELIER
27	16	6	0.79434	CEILING SUSPENDED/ATTIC	CEILING SUSPENDED PENDANT
28	16	16	0.20566	CEILING SUSPENDED/ATTIC	OTHER INDOOR
29	17	17	1.00000	CEILING /YARD	OUTDOOR CEILING
30	18	8	1.00000	WALL/ATTIC	WALL SCONCE
31	19	9	1.00000	WALL/BATHROOM	WALL VANITY
32	20	8	1.00000	WALL/BEDROOM	WALL SCONCE
33	21	16	0.01775	WALL/GARAGE	OTHER INDOOR
34	21	18	0.18871	WALL/GARAGE	OUTDOOR WALL FLOOD
35	21	19	0.75766	WALL/GARAGE	OUTDOOR WALL LANTERN
36	21	20	0.03589	WALL/GARAGE	OUTDOOR WALL BARN
37	22	18	0.33111	WALL/YARD	OUTDOOR WALL FLOOD
38	22	19	0.63080	WALL/YARD	OUTDOOR WALL LANTERN
39	22	20	0.03228	WALL/YARD	OUTDOOR WALL BARN
40	22	21	0.00581	WALL/YARD	OTHER OUTDOOR
41	23	11	0.09357	TABLE/BEDROOM	TABLE LAMP SMALL
42	23	12	0.90643	TABLE/BEDROOM	TABLE LAMP LARGE
43	24	11	0.07218	TABLE/FAMILY	TABLE LAMP SMALL
44	24	12	0.92782	TABLE/FAMILY	TABLE LAMP LARGE
45	25	11	0.06556	TABLE/LIVING	TABLE LAMP SMALL
46	25	12	0.93444	TABLE/LIVING	TABLE LAMP LARGE
47	26	13	0.51916	FLOOR/BEDROOM	FLOOR LAMP TORCHIER
48	26	14	0.44380	FLOOR/BEDROOM	FLOOR LAMP TRADITIONAL
49	26	15	0.03704	FLOOR/BEDROOM	FLOOR LAMP TASK
50	27	13	0.49441	FLOOR/LIVING	FLOOR LAMP TORCHIER
51	27	14	0.45248	FLOOR/LIVING	FLOOR LAMP TRADITIONAL
52	27	15	0.05311	FLOOR/LIVING	FLOOR LAMP TASK
53	28	10	1.00000	UNDER/KITCHEN-DINING	UNDER CABINET
54	29	1	0.07615	OTHER/INSIDE	CEILING RECESSED CANS
55	29	2	0.15790	OTHER/INSIDE	CEILING RECESSED TROFFERS
56	29	13	0.00948	OTHER/INSIDE	FLOOR LAMP TORCHIER
57	29	14	0.02240	OTHER/INSIDE	FLOOR LAMP TRADITIONAL
58	29	15	0.00244	OTHER/INSIDE	FLOOR LAMP TASK
59	29	16	0.73163	OTHER/INSIDE	OTHER INDOOR
60	30	21	1.00000	OTHER/YARD	OTHER OUTDOOR

FIXTURES AND LAMPS/BALLASTS LINK FILE LISTING

OBS	FIX	ID_LAM	PROP_L	FX	LAMPG
1	1	7	0.00280	CEILING RECESSED CANS	FLUOR1
2	1	11	0.01291	CEILING RECESSED CANS	HALOG1
3	1	12	0.00556	CEILING RECESSED CANS	HALOG2
4	1	13	0.01075	CEILING RECESSED CANS	HALOG3
5	1	2	0.03424	CEILING RECESSED CANS	INCAN1
6	1	3	0.56733	CEILING RECESSED CANS	INCAN2
7	1	4	0.16612	CEILING RECESSED CANS	INCAN3
8	1	5	0.18353	CEILING RECESSED CANS	INCAN4
9	1	18	0.01676	CEILING RECESSED CANS	OTHER1
10	2	8	0.02839	CEILING RECESSED TROFFERS	FLUOR2
11	2	9	0.97161	CEILING RECESSED TROFFERS	FLUOR3
12	3	7	0.00672	CEILING SURFACE DECORATIVE	FLUOR1
13	3	8	0.01830	CEILING SURFACE DECORATIVE	FLUOR2
14	3	9	0.39593	CEILING SURFACE DECORATIVE	FLUOR3
15	3	11	0.00032	CEILING SURFACE DECORATIVE	HALOG1
16	3	12	0.00504	CEILING SURFACE DECORATIVE	HALOG2
17	3	13	0.00614	CEILING SURFACE DECORATIVE	HALOG3
18	3	2	0.04326	CEILING SURFACE DECORATIVE	INCAN1
19	3	3	0.46862	CEILING SURFACE DECORATIVE	INCAN2
20	3	4	0.02103	CEILING SURFACE DECORATIVE	INCAN3
21	3	5	0.02991	CEILING SURFACE DECORATIVE	INCAN4
22	3	18	0.00474	CEILING SURFACE DECORATIVE	OTHER1
23	4	7	0.01529	CEILING SURFACE KITCHEN	FLUOR1
24	4	8	0.07120	CEILING SURFACE KITCHEN	FLUOR2
25	4	9	0.88092	CEILING SURFACE KITCHEN	FLUOR3
26	4	11	0.00182	CEILING SURFACE KITCHEN	HALOG1
27	4	2	0.00242	CEILING SURFACE KITCHEN	INCAN1
28	4	3	0.02117	CEILING SURFACE KITCHEN	INCAN2
29	4	18	0.00717	CEILING SURFACE KITCHEN	OTHER1
30	5	11	0.00991	CEILING SURFACE TRACK	HALOG1
31	5	12	0.00163	CEILING SURFACE TRACK	HALOG2
32	5	2	0.08535	CEILING SURFACE TRACK	INCAN1
33	5	3	0.87390	CEILING SURFACE TRACK	INCAN2
34	5	4	0.02025	CEILING SURFACE TRACK	INCAN3
35	5	5	0.00896	CEILING SURFACE TRACK	INCAN4
36	6	7	0.00229	CEILING SUSPENDED PENDANT	FLUOR1
37	6	8	0.00690	CEILING SUSPENDED PENDANT	FLUOR2
38	6	9	0.65242	CEILING SUSPENDED PENDANT	FLUOR3
39	6	11	0.00033	CEILING SUSPENDED PENDANT	HALOG1
40	6	12	0.00189	CEILING SUSPENDED PENDANT	HALOG2
41	6	13	0.01992	CEILING SUSPENDED PENDANT	HALOG3
42	6	2	0.03404	CEILING SUSPENDED PENDANT	INCAN1
43	6	3	0.26385	CEILING SUSPENDED PENDANT	INCAN2
44	6	4	0.00822	CEILING SUSPENDED PENDANT	INCAN3
45	6	5	0.00712	CEILING SUSPENDED PENDANT	INCAN4
46	6	18	0.00302	CEILING SUSPENDED PENDANT	OTHER1
47	7	7	0.00663	CEILING SUSPENDED CHANDELIER	FLUOR1
48	7	2	0.49790	CEILING SUSPENDED CHANDELIER	INCAN1
49	7	3	0.49547	CEILING SUSPENDED CHANDELIER	INCAN2
50	8	7	0.01265	WALL SCONCE	FLUOR1
51	8	8	0.01621	WALL SCONCE	FLUOR2
52	8	9	0.06191	WALL SCONCE	FLUOR3
53	8	11	0.00325	WALL SCONCE	HALOG1
54	8	12	0.00548	WALL SCONCE	HALOG2

FIXTURES AND LAMPS/BALLASTS LINK FILE LISTING

OBS	FIX	ID_LAM	PROP_L	FX	LAMPG
55	8	13	0.00656	WALL SCONCE	HALOG3
56	8	15	0.00645	WALL SCONCE	HID1
57	8	2	0.15127	WALL SCONCE	INCAN1
58	8	3	0.67260	WALL SCONCE	INCAN2
59	8	4	0.02115	WALL SCONCE	INCAN3
60	8	5	0.02608	WALL SCONCE	INCAN4
61	8	18	0.01638	WALL SCONCE	OTHER1
62	9	7	0.00932	WALL VANITY	FLUOR1
63	9	8	0.02187	WALL VANITY	FLUOR2
64	9	9	0.02503	WALL VANITY	FLUOR3
65	9	13	0.00246	WALL VANITY	HALOG3
66	9	2	0.17985	WALL VANITY	INCAN1
67	9	3	0.74648	WALL VANITY	INCAN2
68	9	4	0.00279	WALL VANITY	INCAN3
69	9	5	0.00545	WALL VANITY	INCAN4
70	9	18	0.00674	WALL VANITY	OTHER1
71	10	7	0.04313	UNDER CABINET	FLUOR1
72	10	8	0.18563	UNDER CABINET	FLUOR2
73	10	9	0.17626	UNDER CABINET	FLUOR3
74	10	11	0.00182	UNDER CABINET	HALOG1
75	10	2	0.26916	UNDER CABINET	INCAN1
76	10	3	0.31966	UNDER CABINET	INCAN2
77	10	18	0.00434	UNDER CABINET	OTHER1
78	11	7	0.12933	TABLE LAMP SMALL	FLUOR1
79	11	11	0.02389	TABLE LAMP SMALL	HALOG1
80	11	2	0.84679	TABLE LAMP SMALL	INCAN1
81	12	8	0.02222	TABLE LAMP LARGE	FLUOR2
82	12	9	0.02469	TABLE LAMP LARGE	FLUOR3
83	12	12	0.00319	TABLE LAMP LARGE	HALOG2
84	12	13	0.01300	TABLE LAMP LARGE	HALOG3
85	12	3	0.80740	TABLE LAMP LARGE	INCAN2
86	12	4	0.02861	TABLE LAMP LARGE	INCAN3
87	12	5	0.08871	TABLE LAMP LARGE	INCAN4
88	12	18	0.00969	TABLE LAMP LARGE	OTHER1
89	12	19	0.00249	TABLE LAMP LARGE	OTHER2
90	13	13	0.78352	FLOOR LAMP TORCHIER	HALOG3
91	13	5	0.21648	FLOOR LAMP TORCHIER	INCAN4
92	14	8	0.01050	FLOOR LAMP TRADITIONAL	FLUOR2
93	14	12	0.03653	FLOOR LAMP TRADITIONAL	HALOG2
94	14	3	0.91741	FLOOR LAMP TRADITIONAL	INCAN2
95	14	4	0.03248	FLOOR LAMP TRADITIONAL	INCAN3
96	14	18	0.00307	FLOOR LAMP TRADITIONAL	OTHER1
97	15	7	0.06834	FLOOR LAMP TASK	FLUOR1
98	15	11	0.06387	FLOOR LAMP TASK	HALOG1
99	15	2	0.86779	FLOOR LAMP TASK	INCAN1
100	16	7	0.01584	OTHER INDOOR	FLUOR1
101	16	8	0.03368	OTHER INDOOR	FLUOR2
102	16	9	0.23068	OTHER INDOOR	FLUOR3
103	16	11	0.00317	OTHER INDOOR	HALOG1
104	16	12	0.00839	OTHER INDOOR	HALOG2
105	16	13	0.01272	OTHER INDOOR	HALOG3
106	16	2	0.16994	OTHER INDOOR	INCAN1
107	16	3	0.47757	OTHER INDOOR	INCAN2
108	16	4	0.02413	OTHER INDOOR	INCAN3

FIXTURES AND LAMPS/BALLASTS LINK FILE LISTING

OBS	FIX	ID_LAM	PROP_L	FX	LAMPG
109	16	5	0.01435	OTHER INDOOR	INCAN4
110	16	18	0.00953	OTHER INDOOR	OTHER1
111	17	7	0.00747	OUTDOOR CEILING	FLUOR1
112	17	8	0.00358	OUTDOOR CEILING	FLUOR2
113	17	9	0.33822	OUTDOOR CEILING	FLUOR3
114	17	11	0.00396	OUTDOOR CEILING	HALOG1
115	17	13	0.02493	OUTDOOR CEILING	HALOG3
116	17	2	0.10796	OUTDOOR CEILING	INCAN1
117	17	3	0.45575	OUTDOOR CEILING	INCAN2
118	17	4	0.04260	OUTDOOR CEILING	INCAN3
119	17	5	0.01552	OUTDOOR CEILING	INCAN4
120	18	9	0.04276	OUTDOOR WALL FLOOD	FLUOR3
121	18	12	0.06963	OUTDOOR WALL FLOOD	HALOG2
122	18	13	0.12259	OUTDOOR WALL FLOOD	HALOG3
123	18	4	0.69216	OUTDOOR WALL FLOOD	INCAN3
124	18	5	0.07286	OUTDOOR WALL FLOOD	INCAN4
125	19	7	0.01137	OUTDOOR WALL LANTERN	FLUOR1
126	19	8	0.00339	OUTDOOR WALL LANTERN	FLUOR2
127	19	2	0.10264	OUTDOOR WALL LANTERN	INCAN1
128	19	3	0.88260	OUTDOOR WALL LANTERN	INCAN2
129	20	15	0.19897	OUTDOOR WALL BARN	HID1
130	20	16	0.80103	OUTDOOR WALL BARN	HID2
131	21	7	0.00188	OTHER OUTDOOR	FLUOR1
132	21	8	0.03079	OTHER OUTDOOR	FLUOR2
133	21	9	0.01488	OTHER OUTDOOR	FLUOR3
134	21	11	0.00049	OTHER OUTDOOR	HALOG1
135	21	12	0.05960	OTHER OUTDOOR	HALOG2
136	21	15	0.22490	OTHER OUTDOOR	HID1
137	21	16	0.04097	OTHER OUTDOOR	HID2
138	21	2	0.11721	OTHER OUTDOOR	INCAN1
139	21	3	0.29533	OTHER OUTDOOR	INCAN2
140	21	4	0.12180	OTHER OUTDOOR	INCAN3
141	21	5	0.03821	OTHER OUTDOOR	INCAN4
142	21	18	0.00946	OTHER OUTDOOR	OTHER1
143	21	19	0.04447	OTHER OUTDOOR	OTHER2

APPLICATIONS AND CONTROLS LINK FILE LISTING

OBS	APPL	ID_CON	PROP_W	APP	SWITCH
1	1	7	1.00000	CEILING SURFACE/ATTIC	SIMPLE ON/OFF
2	2	7	1.00000	CEILING SURFACE/BATHROOM	SIMPLE ON/OFF
3	3	1	0.00191	CEILING SURFACE/BEDROOM	DIMMER
4	3	7	0.98884	CEILING SURFACE/BEDROOM	SIMPLE ON/OFF
5	3	11	0.00926	CEILING SURFACE/BEDROOM	3-WAY LOW
6	4	2	0.00086	CEILING SURFACE/GARAGE	MOTION D SINGLE
7	4	6	0.00499	CEILING SURFACE/GARAGE	PHOTO CELL OTHER
8	4	7	0.98019	CEILING SURFACE/GARAGE	SIMPLE ON/OFF
9	4	10	0.01032	CEILING SURFACE/GARAGE	TIMER
10	4	12	0.00364	CEILING SURFACE/GARAGE	3-WAY HIGH
11	5	1	0.00103	CEILING SURFACE/HALL	DIMMER
12	5	7	0.99897	CEILING SURFACE/HALL	SIMPLE ON/OFF
13	6	7	0.99720	CEILING SURFACE/KITCHEN-DINING	SIMPLE ON/OFF
14	6	11	0.00280	CEILING SURFACE/KITCHEN-DINING	3-WAY LOW
15	7	7	0.98445	CEILING SURFACE/LIVING	SIMPLE ON/OFF
16	7	12	0.01555	CEILING SURFACE/LIVING	3-WAY HIGH
17	8	7	1.00000	CEILING RECESSED/BATHROOM	SIMPLE ON/OFF
18	9	7	1.00000	CEILING RECESSED/HALL	SIMPLE ON/OFF
19	10	1	0.00180	CEILING RECESSED/KITCHEN-DINING	DIMMER
20	10	7	0.99820	CEILING RECESSED/KITCHEN-DINING	SIMPLE ON/OFF
21	11	7	0.99229	CEILING RECESSED/LIVING	SIMPLE ON/OFF
22	11	12	0.00771	CEILING RECESSED/LIVING	3-WAY HIGH
23	12	1	0.00141	CEILING SUSPENDED/BEDROOM	DIMMER
24	12	7	0.97448	CEILING SUSPENDED/BEDROOM	SIMPLE ON/OFF
25	12	11	0.02411	CEILING SUSPENDED/BEDROOM	3-WAY LOW
26	13	2	0.00117	CEILING SUSPENDED/GARAGE	MOTION D SINGLE
27	13	7	0.99883	CEILING SUSPENDED/GARAGE	SIMPLE ON/OFF
28	14	1	0.01157	CEILING SUSPENDED/KITCHEN-DINING	DIMMER
29	14	7	0.95826	CEILING SUSPENDED/KITCHEN-DINING	SIMPLE ON/OFF
30	14	11	0.03016	CEILING SUSPENDED/KITCHEN-DINING	3-WAY LOW
31	15	1	0.00651	CEILING SUSPENDED/LIVING	DIMMER
32	15	7	0.93995	CEILING SUSPENDED/LIVING	SIMPLE ON/OFF
33	15	12	0.05354	CEILING SUSPENDED/LIVING	3-WAY HIGH
34	16	7	0.97824	CEILING SUSPENDED/ATTIC	SIMPLE ON/OFF
35	16	11	0.02176	CEILING SUSPENDED/ATTIC	3-WAY LOW
36	17	1	0.01316	CEILING /YARD	DIMMER
37	17	4	0.04318	CEILING /YARD	MOTION D YARD
38	17	5	0.02735	CEILING /YARD	PHOTO CELL OUTDOOR
39	17	7	0.90124	CEILING /YARD	SIMPLE ON/OFF
40	17	8	0.01507	CEILING /YARD	SCHEDULER YARD
41	18	2	0.04851	WALL/ATTIC	MOTION D SINGLE
42	18	6	0.00019	WALL/ATTIC	PHOTO CELL OTHER
43	18	7	0.93519	WALL/ATTIC	SIMPLE ON/OFF
44	18	11	0.01610	WALL/ATTIC	3-WAY LOW
45	19	1	0.00002	WALL/BATHROOM	DIMMER
46	19	6	0.00570	WALL/BATHROOM	PHOTO CELL OTHER
47	19	7	0.99428	WALL/BATHROOM	SIMPLE ON/OFF
48	20	6	0.00349	WALL/BEDROOM	PHOTO CELL OTHER
49	20	7	0.90980	WALL/BEDROOM	SIMPLE ON/OFF
50	20	11	0.08671	WALL/BEDROOM	3-WAY LOW
51	21	1	0.00776	WALL/GARAGE	DIMMER
52	21	2	0.09668	WALL/GARAGE	MOTION D SINGLE
53	21	6	0.01909	WALL/GARAGE	PHOTO CELL OTHER
54	21	7	0.85658	WALL/GARAGE	SIMPLE ON/OFF

APPLICATIONS AND CONTROLS LINK FILE LISTING

OBS	APPL	ID_CON	PROP_W	APP	SWITCH
55	21	10	0.01988	WALL/GARAGE	TIMER
56	22	4	0.13353	WALL/YARD	MOTION D YARD
57	22	5	0.03093	WALL/YARD	PHOTO CELL OUTDOOR
58	22	7	0.83289	WALL/YARD	SIMPLE ON/OFF
59	22	8	0.00266	WALL/YARD	SCHEDULER YARD
60	23	1	0.01297	TABLE/BEDROOM	DIMMER
61	23	2	0.00770	TABLE/BEDROOM	MOTION D SINGLE
62	23	7	0.64329	TABLE/BEDROOM	SIMPLE ON/OFF
63	23	10	0.00237	TABLE/BEDROOM	TIMER
64	23	11	0.33367	TABLE/BEDROOM	3-WAY LOW
65	24	1	0.01709	TABLE/FAMILY	DIMMER
66	24	7	0.55359	TABLE/FAMILY	SIMPLE ON/OFF
67	24	9	0.01011	TABLE/FAMILY	SCHEDULER INDOOR
68	24	12	0.41922	TABLE/FAMILY	3-WAY HIGH
69	25	1	0.01066	TABLE/LIVING	DIMMER
70	25	3	0.00078	TABLE/LIVING	MOTION D MULTI
71	25	7	0.43717	TABLE/LIVING	SIMPLE ON/OFF
72	25	9	0.00827	TABLE/LIVING	SCHEDULER INDOOR
73	25	12	0.54312	TABLE/LIVING	3-WAY HIGH
74	26	1	0.33844	FLOOR/BEDROOM	DIMMER
75	26	2	0.00481	FLOOR/BEDROOM	MOTION D SINGLE
76	26	7	0.48103	FLOOR/BEDROOM	SIMPLE ON/OFF
77	26	11	0.17571	FLOOR/BEDROOM	3-WAY LOW
78	27	1	0.25313	FLOOR/LIVING	DIMMER
79	27	7	0.40203	FLOOR/LIVING	SIMPLE ON/OFF
80	27	9	0.00729	FLOOR/LIVING	SCHEDULER INDOOR
81	27	12	0.33756	FLOOR/LIVING	3-WAY HIGH
82	28	1	0.00240	UNDER/KITCHEN-DINING	DIMMER
83	28	7	0.98277	UNDER/KITCHEN-DINING	SIMPLE ON/OFF
84	28	11	0.01483	UNDER/KITCHEN-DINING	3-WAY LOW
85	29	1	0.02128	OTHER/INSIDE	DIMMER
86	29	2	0.00087	OTHER/INSIDE	MOTION D SINGLE
87	29	3	0.00052	OTHER/INSIDE	MOTION D MULTI
88	29	6	0.00367	OTHER/INSIDE	PHOTO CELL OTHER
89	29	7	0.89075	OTHER/INSIDE	SIMPLE ON/OFF
90	29	10	0.00333	OTHER/INSIDE	TIMER
91	29	9	0.00177	OTHER/INSIDE	SCHEDULER INDOOR
92	29	11	0.03762	OTHER/INSIDE	3-WAY LOW
93	29	12	0.04018	OTHER/INSIDE	3-WAY HIGH
94	30	5	0.05915	OTHER/YARD	PHOTO CELL OUTDOOR
95	30	7	0.79080	OTHER/YARD	SIMPLE ON/OFF
96	30	8	0.11219	OTHER/YARD	SCHEDULER YARD
97	30	12	0.03786	OTHER/YARD	3-WAY HIGH

AVERAGE LUMENS PER APPLICATION

OBS	APPL	HITS	FIXTURE	ALUMEN	LUMENS	WATTS
1	CEILING SURFACE/ATTIC	4553.8	7442.8	2157.41	9824.5	584.5
2	CEILING SURFACE/BATHROOM	4466.8	5993.5	2010.87	8982.1	519.7
3	CEILING SURFACE/BEDROOM	5351.6	9941.4	2827.22	15130.2	1052.6
4	CEILING SURFACE/GARAGE	2966.5	5272.8	6097.64	18088.4	532.1
5	CEILING SURFACE/HALL	6782.1	9433.3	1370.76	9296.6	664.9
6	CEILING SURFACE/KITCHEN-DINING	7020.6	10645.8	2908.04	20416.1	981.2
7	CEILING SURFACE/LIVING	1752.6	2237.3	2273.58	3984.7	253.4
8	CEILING RECESSED/BATHROOM	3445.3	7512.3	6367.37	21937.7	982.0
9	CEILING RECESSED/HALL	2982.5	5416.6	2086.27	6222.2	436.8
10	CEILING RECESSED/KITCHEN-DINING	5085.8	10230.9	8648.09	43982.9	1144.0
11	CEILING RECESSED/LIVING	853.3	2320.9	5098.87	4351.0	251.5
12	CEILING SUSPENDED/BEDROOM	2739.7	4604.1	2369.10	6490.7	485.9
13	CEILING SUSPENDED/GARAGE	2233.8	4248.1	8803.54	19665.2	390.2
14	CEILING SUSPENDED/KITCHEN-DINING	7516.3	9288.4	2663.19	20017.4	1516.7
15	CEILING SUSPENDED/LIVING	3296.4	4038.9	2085.85	6875.9	527.2
16	CEILING SUSPENDED/ATTIC	818.6	1060.5	2889.77	2365.7	99.2
17	CEILING /YARD	2369.9	4523.8	2643.71	6265.4	337.6
18	WALL/ATTIC	2077.5	3597.1	1815.51	3771.8	241.6
19	WALL/BATHROOM	9035.1	16146.9	3121.42	28202.4	2019.4
20	WALL/BEDROOM	2729.5	5193.9	1867.73	5097.9	360.7
21	WALL/GARAGE	1928.9	2174.1	1504.31	2901.7	194.0
22	WALL/YARD	9352.3	22973.6	3215.47	30072.0	2047.7
23	TABLE/BEDROOM	9136.6	25630.5	2945.68	26913.5	1849.7
24	TABLE/FAMILY	1867.2	3061.3	2093.36	3908.7	251.0
25	TABLE/LIVING	8690.7	17322.2	2488.01	21622.6	1471.5
26	FLOOR/BEDROOM	2215.6	2746.8	2577.84	5711.4	344.0
27	FLOOR/LIVING	4929.3	6118.1	2634.12	12984.4	795.1
28	UNDER/KITCHEN-DINING	3729.1	4549.9	980.99	3658.2	204.2
29	OTHER/INSIDE	17068.6	27918.4	2379.83	40620.2	2128.8
30	OTHER/YARD	1202.7	2128.8	2636.34	3170.8	175.8

FIXTURE TYPE MARKET LUMEN SHARES PER APPLICATION								
OBS	APPL	FIX	HITS	FIXTURE	PROP_L	LUMENS	WATTS	
1	CEILING SURFACE/ATTIC	CEILING SURFACE DECORATIVE	4553.8	7536.4	100.000	9824.5	584.5	
2	CEILING SURFACE/BATHROOM	CEILING SURFACE DECORATIVE	885.1	1103.0	34.429	3092.4	92.5	
3	CEILING SURFACE/BATHROOM	CEILING SURFACE TRACK	4012.5	5029.3	65.571	5889.7	427.2	
4	CEILING SURFACE/BEDROOM	CEILING SURFACE DECORATIVE	5351.6	11064.5	100.000	15130.2	1052.6	
5	CEILING SURFACE/GARAGE	CEILING SURFACE DECORATIVE	2966.5	5359.4	100.000	18088.4	532.1	
6	CEILING SURFACE/HALL	CEILING SURFACE DECORATIVE	918.3	1196.9	8.139	756.6	37.9	
7	CEILING SURFACE/HALL	CEILING SURFACE TRACK	6383.9	8518.0	91.861	8540.0	627.1	
8	CEILING SURFACE/KITCHEN-DINING	CEILING SURFACE KITCHEN	2424.1	3123.7	46.084	9408.6	180.4	
9	CEILING SURFACE/KITCHEN-DINING	CEILING SURFACE TRACK	5437.3	8099.2	53.916	11007.5	800.8	
10	CEILING SURFACE/LIVING	CEILING SURFACE DECORATIVE	541.0	691.4	25.526	1017.1	37.5	
11	CEILING SURFACE/LIVING	CEILING SURFACE TRACK	1288.8	1673.1	74.474	2967.6	215.8	
12	CEILING RECESSED/BATHROOM	CEILING RECESSED CANS	2829.8	5393.5	57.547	12624.5	819.2	
13	CEILING RECESSED/BATHROOM	CEILING RECESSED TROFFERS	1378.5	2141.2	42.453	9313.2	162.8	
14	CEILING RECESSED/HALL	CEILING RECESSED CANS	2947.9	5347.7	95.937	5969.4	432.2	
15	CEILING RECESSED/HALL	CEILING RECESSED TROFFERS	57.4	68.9	4.063	252.8	4.6	
16	CEILING RECESSED/KITCHEN-DINING	CEILING RECESSED CANS	2638.9	4469.7	16.021	7046.3	503.2	
17	CEILING RECESSED/KITCHEN-DINING	CEILING RECESSED TROFFERS	3661.6	5793.6	83.979	36936.6	640.8	
18	CEILING RECESSED/LIVING	CEILING RECESSED CANS	742.0	2051.4	81.018	3525.1	236.7	
19	CEILING RECESSED/LIVING	CEILING RECESSED TROFFERS	122.8	269.5	18.982	825.9	14.9	
20	CEILING SUSPENDED/BEDROOM	CEILING SUSPENDED PENDANT	2032.8	3289.8	47.629	3091.4	217.1	
21	CEILING SUSPENDED/BEDROOM	CEILING SUSPENDED CHANDELIER	1100.6	1592.9	52.371	3399.3	268.8	
22	CEILING SUSPENDED/GARAGE	CEILING SUSPENDED PENDANT	2233.8	4379.5	100.000	19665.2	390.2	
23	CEILING SUSPENDED/KITCHEN-DINING	CEILING SUSPENDED PENDANT	3398.6	4235.6	26.180	5240.6	310.9	
24	CEILING SUSPENDED/KITCHEN-DINING	CEILING SUSPENDED CHANDELIER	5188.6	5642.0	73.820	14776.8	1205.8	
25	CEILING SUSPENDED/LIVING	CEILING SUSPENDED PENDANT	2144.3	2486.8	34.793	2392.3	170.3	
26	CEILING SUSPENDED/LIVING	CEILING SUSPENDED CHANDELIER	1578.6	1786.6	65.207	4483.5	357.0	
27	CEILING SUSPENDED/ATTIC	CEILING SUSPENDED PENDANT	656.0	842.6	79.434	1879.2	58.7	
28	CEILING SUSPENDED/ATTIC	OTHER INDOOR	240.0	262.8	20.566	486.5	40.5	
29	CEILING /YARD	OUTDOOR CEILING	2369.9	4615.7	100.000	6265.4	337.6	
30	WALL/ATTIC	WALL SCONCE	2077.5	3608.5	100.000	3771.8	241.6	
31	WALL/BATHROOM	WALL VANITY	9035.1	17817.2	100.000	28202.4	2019.4	
32	WALL/BEDROOM	WALL SCONCE	2729.5	5354.1	100.000	5097.9	360.7	
33	WALL/GARAGE	OTHER INDOOR	58.0	58.0	1.775	51.5	1.0	
34	WALL/GARAGE	OUTDOOR WALL FLOOD	210.0	210.0	18.871	547.6	34.7	
35	WALL/GARAGE	OUTDOOR WALL LANTERN	1748.3	1894.6	75.766	2198.5	156.2	
36	WALL/GARAGE	OUTDOOR WALL BARN	11.4	11.4	3.589	104.1	2.0	
37	WALL/YARD	OUTDOOR WALL FLOOD	1757.2	3105.5	33.111	9957.2	641.7	
38	WALL/YARD	OUTDOOR WALL LANTERN	9068.4	19802.7	63.080	18969.4	1383.7	
39	WALL/YARD	OUTDOOR WALL BARN	195.9	229.4	3.228	970.7	18.8	
40	WALL/YARD	OTHER OUTDOOR	223.5	234.5	0.581	174.7	3.4	
41	TABLE/BEDROOM	TABLE LAMP SMALL	3806.1	5637.7	9.357	2518.3	213.6	
42	TABLE/BEDROOM	TABLE LAMP LARGE	8361.8	20489.4	90.643	24395.2	1636.1	
43	TABLE/FAMILY	TABLE LAMP SMALL	471.3	553.8	7.218	282.1	20.4	
44	TABLE/FAMILY	TABLE LAMP LARGE	1634.6	2619.1	92.782	3626.6	230.6	
45	TABLE/LIVING	TABLE LAMP SMALL	2158.3	3076.2	6.556	1417.6	111.8	
46	TABLE/LIVING	TABLE LAMP LARGE	8161.9	15078.1	93.444	20205.0	1359.8	
47	FLOOR/BEDROOM	FLOOR LAMP TORCHIER	464.4	516.8	51.916	2965.2	146.3	
48	FLOOR/BEDROOM	FLOOR LAMP TRADITIONAL	1604.2	1961.2	44.380	2534.7	179.2	
49	FLOOR/BEDROOM	FLOOR LAMP TASK	313.7	325.1	3.704	211.5	18.5	
50	FLOOR/LIVING	FLOOR LAMP TORCHIER	1071.8	1188.6	49.441	6419.6	322.3	
51	FLOOR/LIVING	FLOOR LAMP TRADITIONAL	3568.6	4337.5	45.248	5875.2	412.0	
52	FLOOR/LIVING	FLOOR LAMP TASK	715.2	748.4	5.311	689.6	60.8	
53	UNDER/KITCHEN-DINING	UNDER CABINET	3729.1	4613.5	100.000	3658.2	204.2	
54	OTHER/INSIDE	CEILING RECESSED CANS	1258.2	2357.2	7.615	3052.9	212.6	
55	OTHER/INSIDE	CEILING RECESSED TROFFERS	723.0	1162.6	15.790	6329.8	109.7	
56	OTHER/INSIDE	FLOOR LAMP TORCHIER	76.8	88.2	0.948	379.9	20.1	
57	OTHER/INSIDE	FLOOR LAMP TRADITIONAL	585.9	699.2	2.240	898.1	63.0	
58	OTHER/INSIDE	FLOOR LAMP TASK	95.3	95.3	0.244	98.0	5.6	
59	OTHER/INSIDE	OTHER INDOOR	15193.1	23747.8	73.163	29329.8	1704.5	
60	OTHER/YARD	OTHER OUTDOOR	1202.7	2151.7	100.000	3170.8	175.8	

LAMP GROUP LUMEN SHARES BY FIXTURE TYPE

OBS	FIX	LAMPG	HITS	FIXTURE	PROP_L	LUMENS	WATTS
1	CEILING RECESSED CANS	FLUOR1	71.5	71.5	0.280	90.3	2.4
2	CEILING RECESSED CANS	HALOG1	56.4	376.1	1.291	416.0	27.7
3	CEILING RECESSED CANS	HALOG2	66.8	101.1	0.556	179.1	10.5
4	CEILING RECESSED CANS	HALOG3	54.5	54.5	1.075	346.3	16.5
5	CEILING RECESSED CANS	INCAN	201.8	236.1	.	.	.
6	CEILING RECESSED CANS	INCAN1	1138.1	2069.5	3.424	1103.2	100.3
7	CEILING RECESSED CANS	INCAN2	4497.3	13364.8	56.733	18278.4	1305.6
8	CEILING RECESSED CANS	INCAN3	757.0	2249.2	16.612	5352.1	382.3
9	CEILING RECESSED CANS	INCAN4	651.3	937.6	18.353	5912.9	347.8
10	CEILING RECESSED CANS	OTHER	68.3	79.7	.	.	.
11	CEILING RECESSED CANS	OTHER1	79.4	79.4	1.676	539.9	10.8
12	CEILING RECESSED TROFFERS	FLUOR	130.7	153.6	.	.	.
13	CEILING RECESSED TROFFERS	FLUOR2	412.0	821.4	2.839	1523.6	33.9
14	CEILING RECESSED TROFFERS	FLUOR3	4152.2	8460.8	97.161	52134.7	898.9
15	CEILING SURFACE DECORATIVE	FLUOR	60.0	93.5	.	.	.
16	CEILING SURFACE DECORATIVE	FLUOR1	371.5	516.9	0.672	322.2	8.5
17	CEILING SURFACE DECORATIVE	FLUOR2	461.0	666.3	1.830	876.5	19.5
18	CEILING SURFACE DECORATIVE	FLUOR3	1774.4	3467.0	39.593	18968.5	327.0
19	CEILING SURFACE DECORATIVE	HALOG	11.4	80.1	.	.	.
20	CEILING SURFACE DECORATIVE	HALOG1	22.9	22.9	0.032	15.4	1.0
21	CEILING SURFACE DECORATIVE	HALOG2	86.5	86.5	0.504	241.4	14.2
22	CEILING SURFACE DECORATIVE	HALOG3	22.5	44.5	0.614	293.9	14.0
23	CEILING SURFACE DECORATIVE	INCAN	511.0	615.2	.	.	.
24	CEILING SURFACE DECORATIVE	INCAN1	2079.8	3265.3	4.326	2072.5	188.4
25	CEILING SURFACE DECORATIVE	INCAN2	7704.1	16223.4	46.862	22451.4	1603.7
26	CEILING SURFACE DECORATIVE	INCAN3	297.4	449.3	2.103	1007.3	72.0
27	CEILING SURFACE DECORATIVE	INCAN4	270.8	324.3	2.991	1433.0	84.3
28	CEILING SURFACE DECORATIVE	OTHER	768.8	1040.6	.	.	.
29	CEILING SURFACE DECORATIVE	OTHER1	55.7	55.7	0.474	227.0	4.5
30	CEILING SURFACE KITCHEN	FLUOR	34.3	45.8	.	.	.
31	CEILING SURFACE KITCHEN	FLUOR1	190.5	222.9	1.529	143.9	3.8
32	CEILING SURFACE KITCHEN	FLUOR2	452.8	553.8	7.120	669.9	14.9
33	CEILING SURFACE KITCHEN	FLUOR3	1504.2	1700.4	88.092	8288.2	142.9
34	CEILING SURFACE KITCHEN	HALOG1	11.4	11.4	0.182	17.2	1.1
35	CEILING SURFACE KITCHEN	INCAN	54.5	54.5	.	.	.
36	CEILING SURFACE KITCHEN	INCAN1	45.0	45.0	0.242	22.8	2.1
37	CEILING SURFACE KITCHEN	INCAN2	110.6	133.5	2.117	199.2	14.2
38	CEILING SURFACE KITCHEN	OTHER	327.3	338.4	.	.	.
39	CEILING SURFACE KITCHEN	OTHER1	18.0	18.0	0.717	67.5	1.3
40	CEILING SURFACE TRACK	HALOG1	67.5	112.4	0.991	281.6	18.8
41	CEILING SURFACE TRACK	HALOG2	22.5	22.5	0.163	46.3	2.7
42	CEILING SURFACE TRACK	INCAN	313.8	403.7	.	.	.
43	CEILING SURFACE TRACK	INCAN1	2141.2	3031.5	8.535	2424.3	220.4
44	CEILING SURFACE TRACK	INCAN2	8851.0	19514.2	87.390	24822.9	1773.1
45	CEILING SURFACE TRACK	INCAN3	170.3	189.7	2.025	575.1	41.1
46	CEILING SURFACE TRACK	INCAN4	34.7	45.7	0.896	254.6	15.0
47	CEILING SUSPENDED PENDANT	FLUOR	122.3	133.7	.	.	.
48	CEILING SUSPENDED PENDANT	FLUOR1	77.2	122.1	0.229	74.0	1.9
49	CEILING SUSPENDED PENDANT	FLUOR2	220.5	231.6	0.690	222.7	4.9
50	CEILING SUSPENDED PENDANT	FLUOR3	2168.5	3763.1	65.242	21052.7	363.0
51	CEILING SUSPENDED PENDANT	HALOG1	22.1	22.1	0.033	10.8	0.7
52	CEILING SUSPENDED PENDANT	HALOG2	22.1	33.2	0.189	61.0	3.6
53	CEILING SUSPENDED PENDANT	HALOG3	56.8	134.3	1.992	642.7	30.6
54	CEILING SUSPENDED PENDANT	INCAN	180.1	201.7	.	.	.

LAMP GROUP LUMEN SHARES BY FIXTURE TYPE

OBS	FIX	LAMPG	HITS	FIXTURE	PROP_L	LUMENS	WATTS
55	CEILING SUSPENDED PENDANT	INCAN1	1912.3	2370.4	3.404	1098.3	99.8
56	CEILING SUSPENDED PENDANT	INCAN2	4824.8	7573.2	26.385	8514.0	608.1
57	CEILING SUSPENDED PENDANT	INCAN3	132.8	132.8	0.822	265.4	19.0
58	CEILING SUSPENDED PENDANT	INCAN4	66.8	66.8	0.712	229.9	13.5
59	CEILING SUSPENDED PENDANT	OTHER	341.1	416.8	.	.	.
60	CEILING SUSPENDED PENDANT	OTHER1	32.5	32.5	0.302	97.4	1.9
61	CEILING SUSPENDED CHANDELIER	FLUOR1	54.9	54.9	0.663	150.2	4.0
62	CEILING SUSPENDED CHANDELIER	INCAN	78.3	78.3	.	.	.
63	CEILING SUSPENDED CHANDELIER	INCAN1	4396.3	5880.6	49.790	11282.2	1025.7
64	CEILING SUSPENDED CHANDELIER	INCAN2	2483.1	2958.9	49.547	11227.2	801.9
65	CEILING SUSPENDED CHANDELIER	OTHER	48.7	48.7	.	.	.
66	WALL SCONCE	FLUOR	30.4	30.4	.	.	.
67	WALL SCONCE	FLUOR1	137.5	159.9	1.265	112.2	3.0
68	WALL SCONCE	FLUOR2	134.5	134.5	1.621	143.7	3.2
69	WALL SCONCE	FLUOR3	90.8	124.7	6.191	549.1	9.5
70	WALL SCONCE	HALOG1	30.8	42.3	0.325	28.8	1.9
71	WALL SCONCE	HALOG2	11.4	11.4	0.548	48.6	2.9
72	WALL SCONCE	HALOG3	11.1	11.1	0.656	58.2	2.8
73	WALL SCONCE	HID1	11.4	11.4	0.645	57.2	1.1
74	WALL SCONCE	INCAN	304.2	327.1	.	.	.
75	WALL SCONCE	INCAN1	1655.2	2977.1	15.127	1341.8	122.0
76	WALL SCONCE	INCAN2	2798.8	4862.9	67.260	5965.8	426.1
77	WALL SCONCE	INCAN3	56.9	56.9	2.115	187.6	13.4
78	WALL SCONCE	INCAN4	33.9	45.4	2.608	231.4	13.6
79	WALL SCONCE	OTHER	98.3	109.4	.	.	.
80	WALL SCONCE	OTHER1	19.4	58.1	1.638	145.3	2.9
81	WALL VANITY	FLUOR1	292.5	351.1	0.932	263.0	6.9
82	WALL VANITY	FLUOR2	367.8	543.3	2.187	616.7	13.7
83	WALL VANITY	FLUOR3	173.7	196.2	2.503	706.0	12.2
84	WALL VANITY	HALOG3	11.0	11.0	0.246	69.5	3.3
85	WALL VANITY	INCAN	594.8	723.8	.	.	.
86	WALL VANITY	INCAN1	3220.3	4787.3	17.985	5072.3	461.1
87	WALL VANITY	INCAN2	6958.6	10210.6	74.648	21052.5	1503.7
88	WALL VANITY	INCAN3	37.4	37.4	0.279	78.6	5.6
89	WALL VANITY	INCAN4	22.1	22.1	0.545	153.8	9.0
90	WALL VANITY	OTHER	711.1	865.9	.	.	.
91	WALL VANITY	OTHER1	68.5	68.5	0.674	190.0	3.8
92	UNDER CABINET	FLUOR	139.2	150.2	.	.	.
93	UNDER CABINET	FLUOR1	219.3	286.0	4.313	157.8	4.2
94	UNDER CABINET	FLUOR2	587.4	677.3	18.563	679.1	15.1
95	UNDER CABINET	FLUOR3	138.2	199.0	17.626	644.8	11.1
96	UNDER CABINET	HALOG1	11.1	11.1	0.182	6.6	0.4
97	UNDER CABINET	INCAN	143.7	143.7	.	.	.
98	UNDER CABINET	INCAN1	1834.4	1969.2	26.916	984.6	89.5
99	UNDER CABINET	INCAN2	1064.9	1090.2	31.966	1169.4	83.5
100	UNDER CABINET	OTHER	65.5	65.5	.	.	.
101	UNDER CABINET	OTHER1	10.6	21.2	0.434	15.9	0.3
102	TABLE LAMP SMALL	FLUOR1	650.9	814.6	12.933	545.5	14.4
103	TABLE LAMP SMALL	HALOG1	118.6	152.5	2.389	100.8	6.7
104	TABLE LAMP SMALL	INCAN1	4684.0	8300.5	84.679	3571.8	324.7
105	TABLE LAMP LARGE	FLUOR	45.0	45.0	.	.	.
106	TABLE LAMP LARGE	FLUOR2	698.9	955.3	2.222	1071.4	23.8
107	TABLE LAMP LARGE	FLUOR3	282.8	305.3	2.469	1190.8	20.5
108	TABLE LAMP LARGE	HALOG	45.0	45.0	.	.	.

LAMP GROUP LUMEN SHARES BY FIXTURE TYPE

OBS	FIX	LAMPG	HITS	FIXTURE	PROP_L	LUMENS	WATTS
109	TABLE LAMP LARGE	HALOG2	97.4	97.4	0.319	153.6	9.0
110	TABLE LAMP LARGE	HALOG3	115.5	115.5	1.300	627.0	29.9
111	TABLE LAMP LARGE	INCAN	375.1	485.2	.	.	.
112	TABLE LAMP LARGE	INCAN2	9782.3	33483.3	80.740	38938.4	2781.3
113	TABLE LAMP LARGE	INCAN3	491.9	714.5	2.861	1379.9	98.6
114	TABLE LAMP LARGE	INCAN4	940.5	1390.6	8.871	4278.2	251.7
115	TABLE LAMP LARGE	OTHER	324.0	373.0	.	.	.
116	TABLE LAMP LARGE	OTHER1	120.4	162.7	0.969	467.2	9.3
117	TABLE LAMP LARGE	OTHER2	13.9	13.9	0.249	120.3	2.3
118	FLOOR LAMP TORCHIER	HALOG3	883.6	1172.1	78.352	7650.8	364.3
119	FLOOR LAMP TORCHIER	INCAN4	575.7	621.5	21.648	2113.8	124.3
120	FLOOR LAMP TRADITIONAL	FLUOR	11.0	11.0	.	.	.
121	FLOOR LAMP TRADITIONAL	FLUOR2	83.3	83.3	1.050	97.8	2.2
122	FLOOR LAMP TRADITIONAL	HALOG	82.5	115.7	.	.	.
123	FLOOR LAMP TRADITIONAL	HALOG2	127.3	173.1	3.653	340.0	20.0
124	FLOOR LAMP TRADITIONAL	INCAN	116.3	142.1	.	.	.
125	FLOOR LAMP TRADITIONAL	INCAN2	4426.3	6196.7	91.741	8539.3	610.0
126	FLOOR LAMP TRADITIONAL	INCAN3	151.8	151.8	3.248	302.3	21.6
127	FLOOR LAMP TRADITIONAL	OTHER	101.6	112.6	.	.	.
128	FLOOR LAMP TRADITIONAL	OTHER1	11.4	11.4	0.307	28.6	0.6
129	FLOOR LAMP TASK	FLUOR1	82.4	82.4	6.834	68.3	1.8
130	FLOOR LAMP TASK	HALOG1	87.1	106.3	6.387	63.8	4.3
131	FLOOR LAMP TASK	INCAN1	912.9	980.0	86.779	867.0	78.8
132	OTHER INDOOR	FLUOR	164.5	164.5	.	.	.
133	OTHER INDOOR	FLUOR1	549.9	652.9	1.584	473.5	12.5
134	OTHER INDOOR	FLUOR2	805.2	904.0	3.368	1006.5	22.4
135	OTHER INDOOR	FLUOR3	962.8	1510.3	23.068	6893.0	118.8
136	OTHER INDOOR	HALOG1	57.2	125.9	0.317	94.8	6.3
137	OTHER INDOOR	HALOG2	64.3	167.3	0.839	250.7	14.7
138	OTHER INDOOR	HALOG3	33.9	45.4	1.272	380.2	18.1
139	OTHER INDOOR	INCAN	182.3	215.8	.	.	.
140	OTHER INDOOR	INCAN1	4326.5	8449.9	16.994	5078.0	461.6
141	OTHER INDOOR	INCAN2	5559.2	10804.1	47.757	14270.5	1019.3
142	OTHER INDOOR	INCAN3	191.3	315.6	2.413	721.1	51.5
143	OTHER INDOOR	INCAN4	129.4	140.9	1.435	428.8	25.2
144	OTHER INDOOR	OTHER	513.4	671.9	.	.	.
145	OTHER INDOOR	OTHER1	100.4	100.4	0.953	284.6	5.7
146	OUTDOOR CEILING	FLUOR	45.4	45.4	.	.	.
147	OUTDOOR CEILING	FLUOR1	66.3	66.3	0.747	46.8	1.2
148	OUTDOOR CEILING	FLUOR2	22.0	22.0	0.358	22.4	0.5
149	OUTDOOR CEILING	FLUOR3	238.4	403.4	33.822	2119.1	36.5
150	OUTDOOR CEILING	HALOG1	11.0	11.0	0.396	24.8	1.7
151	OUTDOOR CEILING	HALOG3	22.9	22.9	2.493	156.2	7.4
152	OUTDOOR CEILING	INCAN	221.7	373.6	.	.	.
153	OUTDOOR CEILING	INCAN1	698.2	1297.7	10.796	676.4	61.5
154	OUTDOOR CEILING	INCAN2	1551.3	2191.3	45.575	2855.5	204.0
155	OUTDOOR CEILING	INCAN3	93.1	93.1	4.260	266.9	19.1
156	OUTDOOR CEILING	INCAN4	10.6	21.2	1.552	97.3	5.7
157	OUTDOOR CEILING	OTHER	67.9	67.9	.	.	.
158	OUTDOOR WALL FLOOD	FLUOR	22.5	22.5	.	.	.
159	OUTDOOR WALL FLOOD	FLUOR3	63.5	116.0	4.276	449.2	7.7
160	OUTDOOR WALL FLOOD	HALOG	87.2	144.0	.	.	.
161	OUTDOOR WALL FLOOD	HALOG2	187.2	324.8	6.963	731.5	43.0
162	OUTDOOR WALL FLOOD	HALOG3	162.6	196.5	12.259	1287.8	61.3

LAMP GROUP LUMEN SHARES BY FIXTURE TYPE

OBS	FIX	LAMPG	HITS	FIXTURE	PROP_L	LUMENS	WATTS
163	OUTDOOR WALL FLOOD	INCAN3	1448.3	2368.1	69.216	7271.0	519.4
164	OUTDOOR WALL FLOOD	INCAN4	143.7	143.7	7.286	765.3	45.0
165	OUTDOOR WALL LANTERN	FLUOR1	332.7	422.2	1.137	240.7	6.3
166	OUTDOOR WALL LANTERN	FLUOR2	77.5	77.5	0.339	71.8	1.6
167	OUTDOOR WALL LANTERN	INCAN	424.1	574.1	.	.	.
168	OUTDOOR WALL LANTERN	INCAN1	2765.7	4565.9	10.264	2172.8	197.5
169	OUTDOOR WALL LANTERN	INCAN2	8091.4	16057.7	88.260	18682.7	1334.5
170	OUTDOOR WALL BARN	HID	114.8	126.2	.	.	.
171	OUTDOOR WALL BARN	HID1	46.1	46.1	19.897	213.9	4.3
172	OUTDOOR WALL BARN	HID2	57.5	68.6	80.103	861.0	16.6
173	OTHER OUTDOOR	FLUOR1	11.0	11.0	0.188	6.3	0.2
174	OTHER OUTDOOR	FLUOR2	11.4	114.4	3.079	103.0	2.3
175	OTHER OUTDOOR	FLUOR3	11.4	11.4	1.488	49.8	0.9
176	OTHER OUTDOOR	HALOG1	11.0	11.0	0.049	1.7	0.1
177	OTHER OUTDOOR	HALOG2	11.4	22.9	5.960	199.4	11.7
178	OTHER OUTDOOR	HID1	34.3	45.8	22.490	752.4	15.0
179	OTHER OUTDOOR	HID2	15.1	15.1	4.097	137.1	2.6
180	OTHER OUTDOOR	INCAN	101.9	136.2	.	.	.
181	OTHER OUTDOOR	INCAN1	454.6	749.8	11.721	392.1	35.6
182	OTHER OUTDOOR	INCAN2	458.7	628.7	29.533	988.0	70.6
183	OTHER OUTDOOR	INCAN3	64.3	97.4	12.180	407.5	29.1
184	OTHER OUTDOOR	INCAN4	22.5	22.5	3.821	127.8	7.5
185	OTHER OUTDOOR	OTHER	421.6	474.9	.	.	.
186	OTHER OUTDOOR	OTHER1	33.5	33.5	0.946	31.7	0.6
187	OTHER OUTDOOR	OTHER2	11.4	11.4	4.447	148.8	2.9

CONTROL MARKET WATTAGE SHARES PER APPLICATION

OBS	APPL	SWITCH	HITS	FIXTURE	WATTS	PROP_W
1	CEILING SURFACE/ATTIC	SIMPLE ON/OFF	4553.8	7442.8	584.5	100.000
2	CEILING SURFACE/BATHROOM	SIMPLE ON/OFF	4466.8	5993.5	519.7	100.000
3	CEILING SURFACE/BEDROOM	DIMMER	37.3	37.3	2.0	0.191
4	CEILING SURFACE/BEDROOM	SIMPLE ON/OFF	5293.3	9871.6	1040.9	98.884
5	CEILING SURFACE/BEDROOM	3-WAY LOW	32.5	32.5	9.7	0.926
6	CEILING SURFACE/GARAGE	MOTION D SINGLE	11.4	11.4	0.5	0.086
7	CEILING SURFACE/GARAGE	PHOTO CELL OTHER	33.5	33.5	2.7	0.499
8	CEILING SURFACE/GARAGE	SIMPLE ON/OFF	2925.0	5197.1	521.5	98.019
9	CEILING SURFACE/GARAGE	TIMER	11.4	11.4	5.5	1.032
10	CEILING SURFACE/GARAGE	3-WAY HIGH	19.4	19.4	1.9	0.364
11	CEILING SURFACE/HALL	DIMMER	11.4	11.4	0.7	0.103
12	CEILING SURFACE/HALL	SIMPLE ON/OFF	6770.6	9421.9	664.3	99.897
13	CEILING SURFACE/KITCHEN-DINING	SIMPLE ON/OFF	7020.6	10634.4	978.5	99.720
14	CEILING SURFACE/KITCHEN-DINING	3-WAY LOW	11.4	11.4	2.7	0.280
15	CEILING SURFACE/LIVING	SIMPLE ON/OFF	1729.0	2213.7	249.4	98.445
16	CEILING SURFACE/LIVING	3-WAY HIGH	23.6	23.6	3.9	1.555
17	CEILING RECESSED/BATHROOM	SIMPLE ON/OFF	3445.3	7512.3	982.0	100.000
18	CEILING RECESSED/HALL	SIMPLE ON/OFF	2982.5	5416.6	436.8	100.000
19	CEILING RECESSED/KITCHEN-DINING	DIMMER	11.4	34.3	2.1	0.180
20	CEILING RECESSED/KITCHEN-DINING	SIMPLE ON/OFF	5085.8	10196.6	1142.0	99.820
21	CEILING RECESSED/LIVING	SIMPLE ON/OFF	827.5	2295.0	249.6	99.229
22	CEILING RECESSED/LIVING	3-WAY HIGH	25.8	25.8	1.9	0.771
23	CEILING SUSPENDED/BEDROOM	DIMMER	11.4	11.4	0.7	0.141
24	CEILING SUSPENDED/BEDROOM	SIMPLE ON/OFF	2683.7	4492.1	473.5	97.448
25	CEILING SUSPENDED/BEDROOM	3-WAY LOW	89.5	100.5	11.7	2.411
26	CEILING SUSPENDED/GARAGE	MOTION D SINGLE	11.4	11.4	0.5	0.117
27	CEILING SUSPENDED/GARAGE	SIMPLE ON/OFF	2233.8	4236.6	389.8	99.883
28	CEILING SUSPENDED/KITCHEN-DINING	DIMMER	67.5	67.5	17.6	1.157
29	CEILING SUSPENDED/KITCHEN-DINING	SIMPLE ON/OFF	7297.9	8975.2	1453.4	95.826
30	CEILING SUSPENDED/KITCHEN-DINING	3-WAY LOW	234.6	245.6	45.7	3.016
31	CEILING SUSPENDED/LIVING	DIMMER	11.4	11.4	3.4	0.651
32	CEILING SUSPENDED/LIVING	SIMPLE ON/OFF	3192.7	3855.8	495.6	93.995
33	CEILING SUSPENDED/LIVING	3-WAY HIGH	160.2	171.6	28.2	5.354
34	CEILING SUSPENDED/ATTIC	SIMPLE ON/OFF	800.7	1042.5	97.0	97.824
35	CEILING SUSPENDED/ATTIC	3-WAY LOW	18.0	18.0	2.2	2.176
36	CEILING /YARD	DIMMER	22.5	33.5	4.4	1.316
37	CEILING /YARD	MOTION D YARD	67.0	77.6	14.6	4.318
38	CEILING /YARD	PHOTO CELL OUTDOOR	215.4	238.3	9.2	2.735
39	CEILING /YARD	SIMPLE ON/OFF	2284.8	4152.0	304.3	90.124
40	CEILING /YARD	SCHEDULER YARD	22.5	22.5	5.1	1.507
41	WALL/ATTIC	MOTION D SINGLE	64.4	75.5	11.7	4.851
42	WALL/ATTIC	PHOTO CELL OTHER	22.9	22.9	0.0	0.019
43	WALL/ATTIC	SIMPLE ON/OFF	2001.3	3475.8	226.0	93.519
44	WALL/ATTIC	3-WAY LOW	22.9	22.9	3.9	1.610
45	WALL/BATHROOM	DIMMER	11.4	11.4	0.0	0.002
46	WALL/BATHROOM	PHOTO CELL OTHER	454.2	517.5	11.5	0.570
47	WALL/BATHROOM	SIMPLE ON/OFF	8895.1	15617.9	2007.9	99.428
48	WALL/BEDROOM	PHOTO CELL OTHER	149.9	196.5	1.3	0.349
49	WALL/BEDROOM	SIMPLE ON/OFF	2429.4	4619.3	328.2	90.980
50	WALL/BEDROOM	3-WAY LOW	234.2	378.1	31.3	8.671
51	WALL/GARAGE	DIMMER	15.1	15.1	1.5	0.776
52	WALL/GARAGE	MOTION D SINGLE	81.3	81.3	18.8	9.668
53	WALL/GARAGE	PHOTO CELL OTHER	33.9	33.9	3.7	1.909
54	WALL/GARAGE	SIMPLE ON/OFF	1798.6	2021.3	166.2	85.658

CONTROL MARKET WATTAGE SHARES PER APPLICATION

OBS	APPL	SWITCH	HITS	FIXTURE	WATTS	PROP_W
55	WALL/GARAGE	TIMER	22.5	22.5	3.9	1.988
56	WALL/YARD	MOTION D YARD	1123.5	1440.4	273.4	13.353
57	WALL/YARD	PHOTO CELL OUTDOOR	668.6	940.7	63.3	3.093
58	WALL/YARD	SIMPLE ON/OFF	9061.2	20547.6	1705.5	83.289
59	WALL/YARD	SCHEDULER YARD	45.0	45.0	5.4	0.266
60	TABLE/BEDROOM	DIMMER	213.7	306.3	24.0	1.297
61	TABLE/BEDROOM	MOTION D SINGLE	78.2	111.3	14.2	0.770
62	TABLE/BEDROOM	SIMPLE ON/OFF	7672.6	18000.9	1189.9	64.329
63	TABLE/BEDROOM	TIMER	95.8	95.8	4.4	0.237
64	TABLE/BEDROOM	3-WAY LOW	3542.2	7116.2	617.2	33.367
65	TABLE/FAMILY	DIMMER	54.3	54.3	4.3	1.709
66	TABLE/FAMILY	SIMPLE ON/OFF	1408.6	1936.6	138.9	55.359
67	TABLE/FAMILY	SCHEDULER INDOOR	22.9	22.9	2.5	1.011
68	TABLE/FAMILY	3-WAY HIGH	771.7	1047.5	105.2	41.922
69	TABLE/LIVING	DIMMER	97.2	97.2	15.7	1.066
70	TABLE/LIVING	MOTION D MULTI	11.4	11.4	1.1	0.078
71	TABLE/LIVING	SIMPLE ON/OFF	5262.6	8680.4	643.3	43.717
72	TABLE/LIVING	SCHEDULER INDOOR	147.1	147.1	12.2	0.827
73	TABLE/LIVING	3-WAY HIGH	4815.2	8397.2	799.2	54.312
74	FLOOR/BEDROOM	DIMMER	415.2	448.8	116.4	33.844
75	FLOOR/BEDROOM	MOTION D SINGLE	11.0	11.0	1.7	0.481
76	FLOOR/BEDROOM	SIMPLE ON/OFF	1415.7	1725.1	165.5	48.103
77	FLOOR/BEDROOM	3-WAY LOW	505.0	561.8	60.4	17.571
78	FLOOR/LIVING	DIMMER	663.7	779.6	201.3	25.313
79	FLOOR/LIVING	SIMPLE ON/OFF	2645.2	3186.4	319.7	40.203
80	FLOOR/LIVING	SCHEDULER INDOOR	69.6	69.6	5.8	0.729
81	FLOOR/LIVING	3-WAY HIGH	1928.8	2104.9	268.4	33.756
82	UNDER/KITCHEN-DINING	DIMMER	15.1	15.1	0.5	0.240
83	UNDER/KITCHEN-DINING	SIMPLE ON/OFF	3678.6	4476.8	200.6	98.277
84	UNDER/KITCHEN-DINING	3-WAY LOW	58.0	58.0	3.0	1.483
85	OTHER/INSIDE	DIMMER	231.6	303.3	45.3	2.128
86	OTHER/INSIDE	MOTION D SINGLE	44.5	44.5	1.9	0.087
87	OTHER/INSIDE	MOTION D MULTI	11.0	11.0	1.1	0.052
88	OTHER/INSIDE	PHOTO CELL OTHER	364.6	375.2	7.8	0.367
89	OTHER/INSIDE	SIMPLE ON/OFF	16109.4	25425.4	1895.1	89.075
90	OTHER/INSIDE	TIMER	22.5	22.5	7.1	0.333
91	OTHER/INSIDE	SCHEDULER INDOOR	90.0	90.0	3.8	0.177
92	OTHER/INSIDE	3-WAY LOW	723.0	867.8	80.0	3.762
93	OTHER/INSIDE	3-WAY HIGH	655.2	767.6	85.5	4.018
94	OTHER/YARD	MOTION D YARD	11.1	11.1	.	.
95	OTHER/YARD	PHOTO CELL OUTDOOR	268.0	337.6	10.4	5.915
96	OTHER/YARD	SIMPLE ON/OFF	867.5	1601.3	139.0	79.080
97	OTHER/YARD	SCHEDULER YARD	68.3	91.1	19.7	11.219
98	OTHER/YARD	3-WAY HIGH	65.6	87.6	6.7	3.786

5.3 Appendix C: Commercial Model Inputs

COMMERCIAL MODEL DATA INPUTS,

File = cmodel2.doc, final, equivalent to = Comanal3.doc

VARIABLE DEFINITIONS

BUS - BUILDING TYPE
 SPACE - SPACE TYPE
 TECH - TECHNOLOGY GROUP
 SQFT - SQUARE FOOTAGE
 LUMEN_F - LUMENS PER FOOT
 WATTS_F - WATTS PER FOOT
 AWATTS - AVERAGE WATTAGE BY LAMP GROUP
 BALLG - BALLAST GROUP
 LAMPG - LAMP GROUP
 PROP - PROPORTION OF BUILDING FLOOR SPACE
 CONT - CONTROL TECHNOLOGIES
 CON - CONTROL STRATEGIES
 LHOURS - AVERAGE WEEKLY FTE LIGHTING HOURS
 LUMEN_S - MARKET SHARE OF LUMENS

COMMERCIAL TABLE 1 - AVERAGE FTE LIGHTING HOURS BY BUILDING TYPE

OBS	BUS	BU	LHOURS	SQFT
1	1	SMALL OFFICE	52.333	309910272.86
2	2	LARGE OFFICE	68.361	1068066640.77
3	3	RESTAURANT	86.710	118943745.87
4	4	RETAIL	65.109	784803360.94
5	5	GROCERY	121.262	217292387.50
6	6	WAREHOUSE	50.309	996769529.14
7	7	SCHOOL	46.137	685976985.67
8	8	HEALTH	51.194	283178751.70
9	9	LODGING	125.671	277042144.78
10	10	MISCELLANEOUS	58.337	770405870.75

COMMERCIAL TABLE 2: SPACES INPUT FILE

OBS	BUS	BU	SPACE	SP	PROP
1	1	SMALL OFFICE	1	OFF	76.4326
2	1	SMALL OFFICE	2	HALL	1.0709
3	1	SMALL OFFICE	3	RET	0.0908
4	1	SMALL OFFICE	4	DINE	0.1849
5	1	SMALL OFFICE	5	COOK	0.0000
6	1	SMALL OFFICE	6	TECH	1.3455
7	1	SMALL OFFICE	7	CLAS	0.1796
8	1	SMALL OFFICE	8	PUB	0.0101
9	1	SMALL OFFICE	9	LODG	0.0000
10	1	SMALL OFFICE	10	STOR-C	1.2181
11	1	SMALL OFFICE	11	STOR-U	2.2203
12	1	SMALL OFFICE	12	IND	8.4917
13	1	SMALL OFFICE	13	MISC-C	1.9995
14	1	SMALL OFFICE	14	MISC-U	6.6082
15	2	LARGE OFFICE	1	OFF	77.8310
16	2	LARGE OFFICE	2	HALL	1.6592
17	2	LARGE OFFICE	3	RET	0.0845
18	2	LARGE OFFICE	4	DINE	0.0145
19	2	LARGE OFFICE	5	COOK	0.0084
20	2	LARGE OFFICE	6	TECH	0.0000
21	2	LARGE OFFICE	7	CLAS	0.0000
22	2	LARGE OFFICE	8	PUB	0.0594
23	2	LARGE OFFICE	9	LODG	0.0000
24	2	LARGE OFFICE	10	STOR-C	0.0766
25	2	LARGE OFFICE	11	STOR-U	0.8759
26	2	LARGE OFFICE	12	IND	0.0000
27	2	LARGE OFFICE	13	MISC-C	3.6338
28	2	LARGE OFFICE	14	MISC-U	15.5064
29	3	RESTAURANT	1	OFF	14.1744
30	3	RESTAURANT	2	HALL	0.0268
31	3	RESTAURANT	3	RET	0.1717
32	3	RESTAURANT	4	DINE	33.9506
33	3	RESTAURANT	5	COOK	18.1535
34	3	RESTAURANT	6	TECH	0.0000
35	3	RESTAURANT	7	CLAS	0.0000
36	3	RESTAURANT	8	PUB	0.0000
37	3	RESTAURANT	9	LODG	0.4727
38	3	RESTAURANT	10	STOR-C	2.4917
39	3	RESTAURANT	11	STOR-U	2.1466
40	3	RESTAURANT	12	IND	0.0000
41	3	RESTAURANT	13	MISC-C	8.5307
42	3	RESTAURANT	14	MISC-U	16.8825
43	4	RETAIL	1	OFF	31.4007
44	4	RETAIL	2	HALL	1.1154
45	4	RETAIL	3	RET	38.9665
46	4	RETAIL	4	DINE	0.1107
47	4	RETAIL	5	COOK	0.1986
48	4	RETAIL	6	TECH	0.2754
49	4	RETAIL	7	CLAS	0.0000
50	4	RETAIL	8	PUB	0.0000
51	4	RETAIL	9	LODG	0.0000
52	4	RETAIL	10	STOR-C	3.6346
53	4	RETAIL	11	STOR-U	13.5683
54	4	RETAIL	12	IND	0.8047

COMMERCIAL TABLE 2: SPACES INPUT FILE

OBS	BUS	BU	SPACE	SP	PROP
55	4	RETAIL	13	MISC-C	1.2204
56	4	RETAIL	14	MISC-U	7.5810
57	5	GROCERY	1	OFF	20.0451
58	5	GROCERY	2	HALL	0.1968
59	5	GROCERY	3	RET	56.3569
60	5	GROCERY	4	DINE	0.2117
61	5	GROCERY	5	COOK	1.8062
62	5	GROCERY	6	TECH	0.0000
63	5	GROCERY	7	CLAS	0.0000
64	5	GROCERY	8	PUB	0.0000
65	5	GROCERY	9	LODG	0.0000
66	5	GROCERY	10	STOR-C	1.6899
67	5	GROCERY	11	STOR-U	7.8637
68	5	GROCERY	12	IND	0.0405
69	5	GROCERY	13	MISC-C	1.4192
70	5	GROCERY	14	MISC-U	10.3699
71	6	WAREHOUSE	1	OFF	40.4920
72	6	WAREHOUSE	2	HALL	0.3811
73	6	WAREHOUSE	3	RET	0.7148
74	6	WAREHOUSE	4	DINE	0.0000
75	6	WAREHOUSE	5	COOK	0.0042
76	6	WAREHOUSE	6	TECH	1.1222
77	6	WAREHOUSE	7	CLAS	0.0000
78	6	WAREHOUSE	8	PUB	0.0000
79	6	WAREHOUSE	9	LODG	0.0000
80	6	WAREHOUSE	10	STOR-C	1.1383
81	6	WAREHOUSE	11	STOR-U	22.2832
82	6	WAREHOUSE	12	IND	4.1432
83	6	WAREHOUSE	13	MISC-C	5.4675
84	6	WAREHOUSE	14	MISC-U	24.2534
85	7	SCHOOL	1	OFF	23.4294
86	7	SCHOOL	2	HALL	0.6480
87	7	SCHOOL	3	RET	0.0000
88	7	SCHOOL	4	DINE	4.5236
89	7	SCHOOL	5	COOK	5.2788
90	7	SCHOOL	6	TECH	0.0000
91	7	SCHOOL	7	CLAS	37.2015
92	7	SCHOOL	8	PUB	2.6215
93	7	SCHOOL	9	LODG	0.0000
94	7	SCHOOL	10	STOR-C	0.0000
95	7	SCHOOL	11	STOR-U	2.4720
96	7	SCHOOL	12	IND	0.0000
97	7	SCHOOL	13	MISC-C	10.9313
98	7	SCHOOL	14	MISC-U	12.8939
99	8	HEALTH	1	OFF	46.1110
100	8	HEALTH	2	HALL	2.3468
101	8	HEALTH	3	RET	8.9629
102	8	HEALTH	4	DINE	0.8906
103	8	HEALTH	5	COOK	0.4425
104	8	HEALTH	6	TECH	8.7075
105	8	HEALTH	7	CLAS	1.0164
106	8	HEALTH	8	PUB	0.0000
107	8	HEALTH	9	LODG	8.8526
108	8	HEALTH	10	STOR-C	0.0218

COMMERCIAL TABLE 2: SPACES INPUT FILE

OBS	BUS	BU	SPACE	SP	PROP
109	8	HEALTH	11	STOR-U	0.0000
110	8	HEALTH	12	IND	0.0000
111	8	HEALTH	13	MISC-C	8.4456
112	8	HEALTH	14	MISC-U	4.5060
113	9	LODGING	1	OFF	16.2267
114	9	LODGING	2	HALL	3.5095
115	9	LODGING	3	RET	0.0188
116	9	LODGING	4	DINE	1.2898
117	9	LODGING	5	COOK	0.6715
118	9	LODGING	6	TECH	0.0374
119	9	LODGING	7	CLAS	0.1283
120	9	LODGING	8	PUB	1.8566
121	9	LODGING	9	LODG	52.7881
122	9	LODGING	10	STOR-C	0.8602
123	9	LODGING	11	STOR-U	0.0000
124	9	LODGING	12	IND	2.1515
125	9	LODGING	13	MISC-C	1.2768
126	9	LODGING	14	MISC-U	19.1848
127	10	MISCELLANEOUS	1	OFF	18.4082
128	10	MISCELLANEOUS	2	HALL	0.4176
129	10	MISCELLANEOUS	3	RET	3.1040
130	10	MISCELLANEOUS	4	DINE	0.1081
131	10	MISCELLANEOUS	5	COOK	0.3317
132	10	MISCELLANEOUS	6	TECH	0.9203
133	10	MISCELLANEOUS	7	CLAS	1.3359
134	10	MISCELLANEOUS	8	PUB	6.0352
135	10	MISCELLANEOUS	9	LODG	15.5793
136	10	MISCELLANEOUS	10	STOR-C	0.5350
137	10	MISCELLANEOUS	11	STOR-U	2.6662
138	10	MISCELLANEOUS	12	IND	4.1496
139	10	MISCELLANEOUS	13	MISC-C	9.2718
140	10	MISCELLANEOUS	14	MISC-U	35.4283

COMMERCIAL TABLE 3 - LUMENS PER FOOT BY SPACE TYPE

OBS	SPACE	SP	WATTS_F	LUMEN_F
1	1	OFF	1.51	81.16
2	2	HALL	1.80	84.45
3	3	RET	1.94	101.30
4	4	DINE	1.39	58.76
5	5	COOK	1.85	95.58
6	6	TECH	1.42	79.01
7	7	CLAS	1.82	110.25
8	8	PUB	1.47	55.67
9	9	LODG	2.12	42.51
10	10	STOR-C	1.07	63.39
11	11	STOR-U	0.54	33.85
12	12	IND	1.13	72.63
13	13	MISC-C	1.22	58.47
14	14	MISC-U	0.90	59.85

COMMERCIAL TABLE 4 - TECHNOLOGY LUMEN SHARES BY SPACE TYPE

OBS	SPACE	SP	TECH	TE	LUMEN_S
1	1	OFF	1	CFL1	0.5
2	1	OFF	2	CFL2	0.6
3	1	OFF	3	FFL1	81.1
4	1	OFF	4	FFL2	11.1
5	1	OFF	5	IN1	2.2
6	1	OFF	6	IN2	0.4
7	1	OFF	7	IN3	0.9
8	1	OFF	8	HID1	0.5
9	1	OFF	9	HID2	2.5
10	1	OFF	10	OTH	0.2
11	2	HALL	1	CFL1	8.7
12	2	HALL	2	CFL2	1.1
13	2	HALL	3	FFL1	70.5
14	2	HALL	4	FFL2	0.7
15	2	HALL	5	IN1	3.6
16	2	HALL	6	IN2	3.3
17	2	HALL	7	IN3	0.3
18	2	HALL	8	HID1	1.7
19	2	HALL	9	HID2	8.5
20	2	HALL	10	OTH	1.6
21	3	RET	1	CFL1	0.2
22	3	RET	2	CFL2	0.6
23	3	RET	3	FFL1	49.9
24	3	RET	4	FFL2	38.2
25	3	RET	5	IN1	4.1
26	3	RET	6	IN2	0.7
27	3	RET	7	IN3	0.4
28	3	RET	8	HID1	0.2
29	3	RET	9	HID2	4.1
30	3	RET	10	OTH	1.5
31	4	DINE	1	CFL1	1.3
32	4	DINE	2	CFL2	0.2
33	4	DINE	3	FFL1	75.0
34	4	DINE	4	FFL2	7.3
35	4	DINE	5	IN1	12.4
36	4	DINE	6	IN2	0.7
37	4	DINE	7	IN3	0.5
38	4	DINE	8	HID1	0.1
39	4	DINE	9	HID2	1.0
40	4	DINE	10	OTH	1.6
41	5	COOK	1	CFL1	0.3
42	5	COOK	2	CFL2	0.8
43	5	COOK	3	FFL1	87.9
44	5	COOK	4	FFL2	6.1
45	5	COOK	5	IN1	3.4
46	5	COOK	6	IN2	0.2
47	5	COOK	7	IN3	1.0
48	5	COOK	10	OTH	0.4
49	6	TECH	1	CFL1	0.4
50	6	TECH	2	CFL2	1.4
51	6	TECH	3	FFL1	91.3
52	6	TECH	4	FFL2	2.9
53	6	TECH	5	IN1	2.6
54	6	TECH	6	IN2	0.7

COMMERCIAL TABLE 4 - TECHNOLOGY LUMEN SHARES BY SPACE TYPE

OBS	SPACE	SP	TECH	TE	LUMEN_S
55	6	TECH	7	IN3	0.3
56	6	TECH	8	HID1	0.3
57	6	TECH	10	OTH	0.1
58	7	CLAS	1	CFL1	0.5
59	7	CLAS	2	CFL2	0.0
60	7	CLAS	3	FFL1	81.4
61	7	CLAS	4	FFL2	14.3
62	7	CLAS	5	IN1	1.5
63	7	CLAS	6	IN2	0.6
64	7	CLAS	7	IN3	0.1
65	7	CLAS	9	HID2	1.5
66	7	CLAS	10	OTH	0.1
67	8	PUB	1	CFL1	0.9
68	8	PUB	2	CFL2	0.2
69	8	PUB	3	FFL1	56.9
70	8	PUB	4	FFL2	5.6
71	8	PUB	5	IN1	11.1
72	8	PUB	6	IN2	7.5
73	8	PUB	7	IN3	0.1
74	8	PUB	8	HID1	0.1
75	8	PUB	9	HID2	16.0
76	8	PUB	10	OTH	1.6
77	9	LODG	1	CFL1	2.5
78	9	LODG	2	CFL2	2.3
79	9	LODG	3	FFL1	33.7
80	9	LODG	4	FFL2	0.1
81	9	LODG	5	IN1	53.9
82	9	LODG	6	IN2	2.0
83	9	LODG	7	IN3	1.8
84	9	LODG	8	HID1	0.0
85	9	LODG	9	HID2	0.2
86	9	LODG	10	OTH	3.5
87	10	STOR-C	1	CFL1	0.1
88	10	STOR-C	2	CFL2	0.1
89	10	STOR-C	3	FFL1	40.1
90	10	STOR-C	4	FFL2	34.7
91	10	STOR-C	5	IN1	1.5
92	10	STOR-C	6	IN2	0.3
93	10	STOR-C	7	IN3	0.1
94	10	STOR-C	8	HID1	0.2
95	10	STOR-C	9	HID2	22.8
96	10	STOR-C	10	OTH	0.0
97	11	STOR-U	1	CFL1	0.2
98	11	STOR-U	2	CFL2	0.0
99	11	STOR-U	3	FFL1	14.6
100	11	STOR-U	4	FFL2	26.0
101	11	STOR-U	5	IN1	1.3
102	11	STOR-U	6	IN2	0.1
103	11	STOR-U	7	IN3	1.6
104	11	STOR-U	8	HID1	2.3
105	11	STOR-U	9	HID2	53.8
106	11	STOR-U	10	OTH	0.1
107	12	IND	1	CFL1	0.3
108	12	IND	2	CFL2	0.2

COMMERCIAL TABLE 4 - TECHNOLOGY LUMEN SHARES BY SPACE TYPE

OBS	SPACE	SP	TECH	TE	LUMEN_S
109	12	IND	3	FFL1	41.2
110	12	IND	4	FFL2	36.5
111	12	IND	5	IN1	0.3
112	12	IND	6	IN2	0.0
113	12	IND	7	IN3	0.1
114	12	IND	8	HID1	0.0
115	12	IND	9	HID2	21.3
116	12	IND	10	OTH	0.0
117	13	MISC-C	1	CFL1	0.2
118	13	MISC-C	2	CFL2	0.5
119	13	MISC-C	3	FFL1	73.2
120	13	MISC-C	4	FFL2	20.0
121	13	MISC-C	5	IN1	2.1
122	13	MISC-C	6	IN2	0.4
123	13	MISC-C	7	IN3	0.6
124	13	MISC-C	8	HID1	0.4
125	13	MISC-C	9	HID2	2.3
126	13	MISC-C	10	OTH	0.2
127	14	MISC-U	1	CFL1	0.3
128	14	MISC-U	2	CFL2	0.1
129	14	MISC-U	3	FFL1	27.6
130	14	MISC-U	4	FFL2	28.4
131	14	MISC-U	5	IN1	1.2
132	14	MISC-U	6	IN2	0.2
133	14	MISC-U	7	IN3	0.0
134	14	MISC-U	8	HID1	0.2
135	14	MISC-U	9	HID2	42.0
136	14	MISC-U	10	OTH	0.0

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COMMERCIAL TABLE 5 - BALLAST LUMEN SHARES BY TECHNOLOGY TYPE

OBS	BALLG	BA	TECH	TE	LUMEN_S
1	1	CFL STD	1	CFL1	82.0
2	2	CFL ELC	1	CFL1	18.0
3	1	CFL STD	2	CFL2	86.4
4	2	CFL ELC	2	CFL2	13.6
5	4	FFL1 STD	3	FFL1	43.6
6	5	FFL1 HE	3	FFL1	27.6
7	6	FFL1 ELC	3	FFL1	28.8
8	8	FFL2 STD	4	FFL2	61.1
9	9	FFL2 HE	4	FFL2	33.3
10	10	FFL2 ELC	4	FFL2	5.6
11	12	INCAND	5	IN1	100.0
12	12	INCAND	6	IN2	100.0
13	12	INCAND	7	IN3	100.0
14	13	HID STD	8	HID1	100.0
15	14	HID HE	8	HID1	0.0
16	13	HID STD	9	HID2	93.4
17	14	HID HE	9	HID2	6.6
18	17	OTHER	10	OTH	100.0

COMMERCIAL TABLE 6 - LAMP LUMEN SHARES BY BALLAST TYPE

OBS	BALLG	BA	LAMPG	LE	AWATTS	LUMEN_S
1	1	CFL STD	1	FLUOR 1-19W STD	11.744	48.7
2	1	CFL STD	3	FLUOR 20-30W STD	25.210	51.3
3	2	CFL ELC	2	FLUOR 1-19W ELC	17.001	62.1
4	2	CFL ELC	4	FLUOR 20-30W ELC	23.200	37.9
5	4	FFL1 STD	6	FLUOR 32W STD	32.000	0.0
6	4	FFL1 STD	10	FLUOR 34W STD	34.000	20.3
7	4	FFL1 STD	14	FLUOR 40W STD	40.000	79.6
8	4	FFL1 STD	18	FLUOR OTH 31-40W STD	31.000	0.1
9	4	FFL1 STD	22	FLUOR 41-95W STD	60.000	0.0
10	5	FFL1 HE	7	FLUOR 32W HE	32.000	6.4
11	5	FFL1 HE	11	FLUOR 34W HE	34.000	55.2
12	5	FFL1 HE	15	FLUOR 40W HE	40.000	38.3
13	5	FFL1 HE	20	FLUOR OTH 31-40W HE	31.591	0.1
14	6	FFL1 ELC	8	FLUOR 32W ELC	32.000	92.1
15	6	FFL1 ELC	12	FLUOR 34W ELC	34.000	1.8
16	6	FFL1 ELC	16	FLUOR 40W ELC	40.000	5.9
17	6	FFL1 ELC	19	FLUOR OTH 31-40W ELC	31.000	0.2
18	6	FFL1 ELC	24	FLUOR 41-95W ELC	60.000	0.0
19	8	FFL2 STD	22	FLUOR 41-95W STD	72.502	82.1
20	8	FFL2 STD	25	FLUOR 96+W STD	207.655	17.9
21	9	FFL2 HE	23	FLUOR 41-95W HE	66.400	96.1
22	9	FFL2 HE	26	FLUOR 96+W HE	108.826	3.9
23	10	FFL2 ELC	24	FLUOR 41-95W ELC	61.193	97.4
24	10	FFL2 ELC	27	FLUOR 96+W ELC	110.000	2.6
25	12	INCAND	28	INCAN 1-50W	28.258	5.7
26	12	INCAND	29	INCAN 51-100W	78.508	65.0
27	12	INCAND	30	INCAN 101-150W	149.518	9.7
28	12	INCAND	31	INCAN 151+W	420.597	10.9
29	12	INCAND	32	T-H 1-150W	66.149	5.7
30	12	INCAND	33	T-H 151-249W	197.918	0.0
31	12	INCAND	34	T-H 250+W	320.120	3.0
32	13	HID STD	35	MH 1-150W STD	150.000	0.5
33	13	HID STD	36	MH 151+W STD	384.373	18.3
34	13	HID STD	38	HPS 1-150W STD	133.997	2.0
35	13	HID STD	39	HPS 151+W STD	330.339	71.5
36	13	HID STD	40	LPS STD	51.335	0.3
37	13	HID STD	41	MV STD	193.172	7.4
38	14	HID HE	37	MH 151+W HE	587.688	100.0
39	17	OTHER	42	NEON	10.000	65.2
40	17	OTHER	43	OTHER	46.402	34.8

COMMERCIAL TABLE 7A - CONTROL STRATEGY LUMEN SHARES BY SPACE TYPE

OBS	SPACE	SP	CON	CO	LUMEN_S
1	1	OFF	1	ON/OFF SWITCH	66.3
2	1	OFF	2	SENSOR	12.9
3	1	OFF	3	DIMMER	0.8
4	1	OFF	4	PHOTOCELL	0.0
5	1	OFF	5	TIME CLOCK	5.8
6	1	OFF	6	EMS	14.3
7	2	HALL	1	ON/OFF SWITCH	37.8
8	2	HALL	2	SENSOR	1.2
9	2	HALL	3	DIMMER	0.0
10	2	HALL	4	PHOTOCELL	0.0
11	2	HALL	5	TIME CLOCK	32.6
12	2	HALL	6	EMS	28.4
13	3	RET	1	ON/OFF SWITCH	59.1
14	3	RET	2	SENSOR	0.3
15	3	RET	4	PHOTOCELL	0.0
16	3	RET	5	TIME CLOCK	17.4
17	3	RET	6	EMS	23.2
18	4	DINE	1	ON/OFF SWITCH	54.5
19	4	DINE	2	SENSOR	41.7
20	4	DINE	3	DIMMER	1.0
21	4	DINE	5	TIME CLOCK	1.7
22	4	DINE	6	EMS	1.1
23	5	COOK	1	ON/OFF SWITCH	77.8
24	5	COOK	2	SENSOR	18.9
25	5	COOK	3	DIMMER	0.0
26	5	COOK	5	TIME CLOCK	0.3
27	5	COOK	6	EMS	2.9
28	6	TECH	1	ON/OFF SWITCH	86.7
29	6	TECH	2	SENSOR	11.0
30	6	TECH	3	DIMMER	0.4
31	6	TECH	5	TIME CLOCK	1.9
32	7	CLAS	1	ON/OFF SWITCH	53.9
33	7	CLAS	2	SENSOR	43.7
34	7	CLAS	3	DIMMER	2.4
35	7	CLAS	5	TIME CLOCK	0.0
36	8	PUB	1	ON/OFF SWITCH	91.7
37	8	PUB	3	DIMMER	1.3
38	8	PUB	5	TIME CLOCK	6.1
39	8	PUB	6	EMS	0.9
40	9	LODG	1	ON/OFF SWITCH	99.5
41	9	LODG	3	DIMMER	0.0
42	9	LODG	5	TIME CLOCK	0.5
43	10	STOR-C	1	ON/OFF SWITCH	55.0
44	10	STOR-C	2	SENSOR	3.3
45	10	STOR-C	5	TIME CLOCK	9.0
46	10	STOR-C	6	EMS	32.7
47	11	STOR-U	1	ON/OFF SWITCH	91.7
48	11	STOR-U	2	SENSOR	0.0
49	11	STOR-U	5	TIME CLOCK	1.1
50	11	STOR-U	6	EMS	7.1
51	12	IND	1	ON/OFF SWITCH	82.7
52	12	IND	2	SENSOR	9.7
53	12	IND	3	DIMMER	0.1
54	12	IND	4	PHOTOCELL	1.9
55	12	IND	5	TIME CLOCK	5.5
56	12	IND	6	EMS	0.0
57	13	MISC-C	1	ON/OFF SWITCH	90.2
58	13	MISC-C	2	SENSOR	1.5
59	13	MISC-C	3	DIMMER	0.6
60	13	MISC-C	4	PHOTOCELL	1.6
61	13	MISC-C	5	TIME CLOCK	5.0
62	13	MISC-C	6	EMS	1.0
63	14	MISC-U	1	ON/OFF SWITCH	52.1
64	14	MISC-U	2	SENSOR	0.0

65	14	MISC-U	3	DIMMER	0.0
66	14	MISC-U	4	PHOTOCELL	1.9
67	14	MISC-U	5	TIME CLOCK	3.7
68	14	MISC-U	6	EMS	42.3

COMMERCIAL TABLE 7 - CONTROL LUMEN SHARES BY BALLAST TYPE

OBS	BALLG	BA	CONTG	CE	AWATTS	LUMEN_S
1	1	CFL STD	1	CFL STD ON-OFF	15.718	66.1
2	1	CFL STD	2	CFL STD OCC-SEN	18.177	9.8
3	1	CFL STD	3	CFL STD DIMMER	13.000	0.0
4	1	CFL STD	4	CFL STD PHOTO	9.861	0.1
5	1	CFL STD	5	CFL STD TIME	14.303	3.2
6	1	CFL STD	6	CFL STD EMS	16.214	20.9
7	2	CFL ELC	7	CFL ELC ON-OFF	18.407	41.7
8	2	CFL ELC	8	CFL ELC OCC-SEN	22.365	16.5
9	2	CFL ELC	9	CFL ELC DIMMER	17.427	0.1
10	2	CFL ELC	11	CFL ELC TIME	17.000	15.4
11	2	CFL ELC	12	CFL ELC EMS	19.050	26.3
12	4	FFL1 STD	19	FFL1 STD ON-OFF	38.462	83.2
13	4	FFL1 STD	20	FFL1 STD OCC-SEN	38.927	3.2
14	4	FFL1 STD	21	FFL1 STD DIMMER	39.967	0.3
15	4	FFL1 STD	22	FFL1 STD PHOTO	35.612	0.0
16	4	FFL1 STD	23	FFL1 STD TIME	39.076	4.6
17	4	FFL1 STD	24	FFL1 STD EMS	37.722	8.7
18	5	FFL1 HE	25	FFL1 HE ON-OFF	36.168	67.3
19	5	FFL1 HE	26	FFL1 HE OCC-SEN	36.558	6.0
20	5	FFL1 HE	27	FFL1 HE DIMMER	35.862	0.1
21	5	FFL1 HE	28	FFL1 HE PHOTO	34.000	0.0
22	5	FFL1 HE	29	FFL1 HE TIME	34.275	10.8
23	5	FFL1 HE	30	FFL1 HE EMS	35.211	15.9
24	6	FFL1 ELC	31	FFL1 ELC ON-OFF	32.722	51.4
25	6	FFL1 ELC	32	FFL1 ELC OCC-SEN	32.971	6.3
26	6	FFL1 ELC	33	FFL1 ELC DIMMER	32.000	0.0
27	6	FFL1 ELC	34	FFL1 ELC PHOTO	32.000	0.4
28	6	FFL1 ELC	35	FFL1 ELC TIME	32.066	29.7
29	6	FFL1 ELC	36	FFL1 ELC EMS	32.094	12.1
30	8	FFL2 STD	43	FFL2 STD ON-OFF	76.095	82.7
31	8	FFL2 STD	44	FFL2 STD OCC-SEN	142.296	14.1
32	8	FFL2 STD	45	FFL2 STD DIMMER	62.830	0.1
33	8	FFL2 STD	46	FFL2 STD PHOTO	50.455	0.0
34	8	FFL2 STD	47	FFL2 STD TIME	75.000	0.2
35	8	FFL2 STD	48	FFL2 STD EMS	78.001	2.9
36	9	FFL2 HE	49	FFL2 HE ON-OFF	69.629	61.4
37	9	FFL2 HE	50	FFL2 HE OCC-SEN	63.212	11.9
38	9	FFL2 HE	51	FFL2 HE DIMMER	60.000	0.0
39	9	FFL2 HE	53	FFL2 HE TIME	60.000	0.5
40	9	FFL2 HE	54	FFL2 HE EMS	64.482	26.1
41	10	FFL2 ELC	55	FFL2 ELC ON-OFF	62.167	31.4
42	10	FFL2 ELC	56	FFL2 ELC OCC-SEN	60.000	30.3
43	10	FFL2 ELC	59	FFL2 ELC TIME	60.000	0.4
44	10	FFL2 ELC	60	FFL2 ELC EMS	63.344	37.9
45	12	INCAND	67	INCAN ON-OFF	77.324	78.6
46	12	INCAND	68	INCAN OCC-SEN	82.655	6.4
47	12	INCAND	69	INCAN DIMMER	82.619	0.1
48	12	INCAND	70	INCAN PHOTO	202.979	8.4
49	12	INCAND	71	INCAN TIME	24.883	0.1
50	12	INCAND	72	INCAN EMS	55.423	6.3
51	13	HID STD	73	HID STD ON-OFF	316.509	36.8
52	13	HID STD	74	HID STD OCC-SEN	176.723	6.1
53	13	HID STD	75	HID STD DIMMER	315.931	2.9
54	13	HID STD	76	HID STD PHOTO	400.000	0.2
55	13	HID STD	77	HID STD TIME	175.000	0.3
56	13	HID STD	78	HID STD EMS	327.301	53.7
57	14	HID HE	79	HID HE ON-OFF	376.144	9.0
58	14	HID HE	80	HID HE OCC-SEN	426.893	83.1
59	14	HID HE	81	HID HE DIMMER	265.425	5.9
60	14	HID HE	82	HID HE PHOTO	143.714	0.0
61	14	HID HE	83	HID HE TIME	77.836	0.0
62	14	HID HE	84	HID HE EMS	188.050	2.0

63	17	OTHER	97	OTHER ON-OFF	19.202	94.1
64	17	OTHER	98	OTHER OCC-SEN	138.690	4.1
65	17	OTHER	100	OTHER PHOTO	175.000	0.0
66	17	OTHER	102	OTHER EMS	2.881	1.8

COMMERCIAL TABLE 8 - AVERAGE FTE LIGHTING HOURS BY SPACE & BUILDING TYPE

OBS	BUS	BU	SPACE	SP	LHOURS
1	1	SMALL OFFICE	1	OFF	50.815
2	1	SMALL OFFICE	2	HALL	81.095
3	1	SMALL OFFICE	3	RET	74.258
4	1	SMALL OFFICE	4	DINE	37.867
5	1	SMALL OFFICE	6	TECH	66.728
6	1	SMALL OFFICE	7	CLAS	27.000
7	1	SMALL OFFICE	8	PUB	96.000
8	1	SMALL OFFICE	9	LODG	57.300
9	1	SMALL OFFICE	10	STOR-C	36.254
10	1	SMALL OFFICE	11	STOR-U	57.368
11	1	SMALL OFFICE	12	IND	69.646
12	1	SMALL OFFICE	13	MISC-C	39.953
13	1	SMALL OFFICE	14	MISC-U	58.558
14	2	LARGE OFFICE	1	OFF	66.624
15	2	LARGE OFFICE	2	HALL	95.831
16	2	LARGE OFFICE	3	RET	55.967
17	2	LARGE OFFICE	5	COOK	52.851
18	2	LARGE OFFICE	8	PUB	42.500
19	2	LARGE OFFICE	10	STOR-C	50.000
20	2	LARGE OFFICE	11	STOR-U	27.189
21	2	LARGE OFFICE	13	MISC-C	58.158
22	2	LARGE OFFICE	14	MISC-U	83.148
23	3	RESTAURANT	1	OFF	79.237
24	3	RESTAURANT	2	HALL	68.945
25	3	RESTAURANT	3	RET	110.726
26	3	RESTAURANT	4	DINE	87.955
27	3	RESTAURANT	5	COOK	87.962
28	3	RESTAURANT	10	STOR-C	88.991
29	3	RESTAURANT	11	STOR-U	82.683
30	3	RESTAURANT	13	MISC-C	80.352
31	3	RESTAURANT	14	MISC-U	95.194
32	4	RETAIL	1	OFF	71.293
33	4	RETAIL	2	HALL	117.725
34	4	RETAIL	3	RET	65.281
35	4	RETAIL	4	DINE	116.129
36	4	RETAIL	5	COOK	77.994
37	4	RETAIL	10	STOR-C	78.472
38	4	RETAIL	11	STOR-U	83.773
39	4	RETAIL	12	IND	43.507
40	4	RETAIL	13	MISC-C	66.985
41	4	RETAIL	14	MISC-U	67.439
42	5	GROCERY	1	OFF	106.337
43	5	GROCERY	2	HALL	154.774
44	5	GROCERY	3	RET	123.156
45	5	GROCERY	4	DINE	91.255
46	5	GROCERY	5	COOK	92.572
47	5	GROCERY	10	STOR-C	109.083
48	5	GROCERY	11	STOR-U	142.959
49	5	GROCERY	12	IND	119.000
50	5	GROCERY	13	MISC-C	96.281
51	5	GROCERY	14	MISC-U	61.234
52	6	WAREHOUSE	1	OFF	47.080
53	6	WAREHOUSE	2	HALL	87.250
54	6	WAREHOUSE	3	RET	76.000

COMMERCIAL TABLE 8 - AVERAGE FTE LIGHTING HOURS BY SPACE & BUILDING TYPE

OBS	BUS	BU	SPACE	SP	LHOURS
55	6	WAREHOUSE	5	COOK	4.000
56	6	WAREHOUSE	6	TECH	67.500
57	6	WAREHOUSE	10	STOR-C	92.807
58	6	WAREHOUSE	11	STOR-U	83.923
59	6	WAREHOUSE	12	IND	119.110
60	6	WAREHOUSE	13	MISC-C	92.977
61	6	WAREHOUSE	14	MISC-U	51.095
62	7	SCHOOL	1	OFF	49.013
63	7	SCHOOL	2	HALL	15.000
64	7	SCHOOL	4	DINE	40.000
65	7	SCHOOL	5	COOK	35.246
66	7	SCHOOL	7	CLAS	45.119
67	7	SCHOOL	8	PUB	23.606
68	7	SCHOOL	11	STOR-U	21.663
69	7	SCHOOL	13	MISC-C	30.398
70	7	SCHOOL	14	MISC-U	42.118
71	8	HEALTH	1	OFF	47.078
72	8	HEALTH	2	HALL	127.133
73	8	HEALTH	3	RET	165.984
74	8	HEALTH	4	DINE	132.800
75	8	HEALTH	5	COOK	112.000
76	8	HEALTH	6	TECH	51.213
77	8	HEALTH	7	CLAS	45.000
78	8	HEALTH	9	LODG	112.372
79	8	HEALTH	10	STOR-C	30.000
80	8	HEALTH	11	STOR-U	54.000
81	8	HEALTH	13	MISC-C	68.817
82	8	HEALTH	14	MISC-U	71.801
83	9	LODGING	1	OFF	105.674
84	9	LODGING	2	HALL	157.115
85	9	LODGING	3	RET	119.000
86	9	LODGING	4	DINE	89.958
87	9	LODGING	5	COOK	105.276
88	9	LODGING	6	TECH	168.000
89	9	LODGING	7	CLAS	32.000
90	9	LODGING	8	PUB	107.333
91	9	LODGING	9	LODG	20.000
92	9	LODGING	10	STOR-C	163.818
93	9	LODGING	12	IND	86.313
94	9	LODGING	13	MISC-C	128.910
95	9	LODGING	14	MISC-U	100.692
96	10	MISCELLANEOUS	1	OFF	50.970
97	10	MISCELLANEOUS	2	HALL	96.180
98	10	MISCELLANEOUS	3	RET	105.307
99	10	MISCELLANEOUS	4	DINE	69.800
100	10	MISCELLANEOUS	5	COOK	36.734
101	10	MISCELLANEOUS	6	TECH	63.250
102	10	MISCELLANEOUS	7	CLAS	41.714
103	10	MISCELLANEOUS	8	PUB	32.701
104	10	MISCELLANEOUS	9	LODG	20.000
105	10	MISCELLANEOUS	10	STOR-C	76.821
106	10	MISCELLANEOUS	11	STOR-U	93.127
107	10	MISCELLANEOUS	12	IND	80.927
108	10	MISCELLANEOUS	13	MISC-C	57.715
109	10	MISCELLANEOUS	14	MISC-U	70.5096

COMMERCIAL TABLE 9 - AVERAGE FTE LIGHTING HOURS BY SPACE TYPE

OBS	SPACE	SP	LHOURS
1	1	OFF	56.354
2	2	HALL	98.157
3	3	RET	88.763
4	4	DINE	86.230
5	5	COOK	79.329
6	6	TECH	55.802
7	7	CLAS	44.670
8	8	PUB	32.443
9	9	LODG	127.860
10	10	STOR-C	81.823
11	11	STOR-U	98.004
12	12	IND	79.066
13	13	MISC-C	63.017
14	14	MISC-U	67.799

5.4 Appendix D: Residential Scenario Specifications

5.4.1 N1: Efficient Outdoor Fixtures

Scenario Title:	Improve outdoor fixture lamp efficacy	ID:N1
Scenario Description:	For new construction. Wall or ceiling mounted outdoor fixtures. Increase market share of fluorescent lamp types at expense of incandescents.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Outdoor, Ceiling, Porch	Inc 1-50 W	reduce lumen share by 50%; straight line	for Fluor 1-19 W
	Inc 51-100 W	ditto	for Fluor 20-30 W
	Inc 101-150 W	ditto	for Fluor 31+ W
Outdoor Wall, Flood	Inc 101-150 W	ditto	for Fluor 31+ W
Outdoor, Wall, Lantern	Inc 1-50 W	ditto	for Fluor 1-19 W
	Inc 51-100 W	ditto	for Fluor 20-30 W

Notes: Incandescents larger than 150 W only occur in insignificant quantities, and so are neglected in this scenario. HID lamps are all lumped together in the "Outdoor, Wall, Barn" fixture type, and are left unchanged here.

5.4.2 N2:Efficient Outdoor Fixtures and Controls

Scenario Title:	Require electrodeless outdoor lamps with motion detector/photocell controls	ID: N2
Scenario Description:	For new construction. Wall or ceiling mounted outdoor fixtures. Require use of electrodeless, high efficacy lamps for all incandescent lamp types. Also, reduce average hours of operation for all switched fixtures by 25% through use of motion detectors/photo cells.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Create new lamp/ballast:	Electrodeless fluorescent (EFL) (induction lamp)	Efficacy of 50 lm/W	Note: Assume new lamp type can be used for all outdoor apps.
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Outdoor, Ceiling, Porch	All incandescent lamp types	reduce lumen share to zero; early penetration	for Electrodeless fluorescent (EFL)
Outdoor Wall, Flood	ditto	ditto	ditto
Outdoor, Wall, Lantern	ditto	ditto	ditto
Other, Outdoor	ditto	ditto	ditto
Create new control:	On/Off to MDP (Motion Detector/Photoce II)	Reduce average hours of op. to 75% of On/Off base	Note: Assume all switched fixtures affected and effect is averaged
All of above fixtures	Simple On/Off	Reduce share to zero; early penetration	for On/Off to MDP

Notes: Assume new lamp type is required to replace incandescent for all residential outdoor lighting. Hold current fluorescent and HID shares constant. Assume control type is applied to all currently switched on/off apps.

5.4.3 N2p: Efficient Outdoor Fixtures w/ Controls, Parametrics

Scenario Title:	Require electrodeless outdoor lamps with motion detector/photocell controls	ID: N2 parametrics
Scenario Description:	For new construction. Wall or ceiling mounted outdoor fixtures. Require use of electrodeless, high efficacy lamps for all incandescent lamp types. Also, reduce average hours of operation for all switched fixtures by 25% through use of motion detectors/photo cells. Test for sensitivity of model to variables.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Create new lamp/ballast:	Electrodeless fluorescent (EFL) (induction lamp)	Efficacy of 50 lm/W	Note: Assume new lamp type can be used for all outdoor apps.
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Outdoor, Ceiling, Porch	All incandescent lamp types	reduce lumen share to zero; early penetration	for Electrodeless fluorescent (EFL)
Outdoor Wall, Flood	ditto	ditto	ditto
Outdoor, Wall, Lantern	ditto	ditto	ditto
Other, Outdoor	ditto	ditto	ditto

Create new control:	On/Off to MDP (Motion Detector/Photocell)	Reduce average hours of op. to 75% of On/Off base	Note: Assume all switched fixtures affected and effect is averaged
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All of above fixtures	Simple On/Off	Reduce share to zero; early penetration	for On/Off to MDP
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Notes: Assume new lamp type is required to replace incandescent for all residential outdoor lighting. Hold current fluorescent and HID shares constant. Assume control type is applied to all currently switched on/off apps.

Run parametrics with straight line, early, late and classic penetration. Label N2-s, N2-e, N2-l, N2-c.

5.4.4 N3: Efficient Ceiling Fixtures

Scenario Title:	Require CFL or fluorescent lamps for ceiling fixtures in new construction	ID: N3
Scenario Description:	New construction. Require recessed, surface or pendant mounted fixtures to use fluorescent/CFL lamps.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Ceiling, Recessed, Cans	Incand 1-50 W	shift all lumens; early penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
	Incand 101-150 W	ditto	for Fluor 30+ W
	Incand 151+ W	ditto	for Halogen 51-150 W
Ceiling, Surface, Decorative/Utility	Incand 1-50 W	shift all lumens; early penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
	Incand 101-150 W	ditto	for Fluor 30+ W
Ceiling, Surface, Kitchen	Incand 1-50 W	shift all lumens; early penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
Ceiling, Suspended, Pendant	Incand 1-50 W	shift all lumens; early penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W

Notes: Chandeliers are not touched under this scenario. Ceiling troffers and coves are already fluorescent, so are likewise not touched.

5.4.5 N4: T-24 Kitchen Compliance

Scenario Title:	Increase Title 24 kitchen fluorescent compliance	ID: N4
Scenario Description:	New construction. Increase penetration of fluorescent ceiling fixtures, with corresponding decrease in incandescents, for surface and recessed fixtures.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96 rev1

Create New Fixture:	Ceiling, Suspended, Kitchen	Lamp/Ballast: Fluor 20-30 W	
Create New Fixture:	Ceiling, Recessed, Kitchen	Lamp/Ballast: Fluor 20-30 W	

Ceiling, Surface, Kitchen	Incand 1-50 W	shift all lumens; early penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
Undercabinet	Incand 1-50 W	shift all lumens; early penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
Appl: Ceiling Suspended, Kitchen/Dining	Fixt: Ceiling, Suspended, Pendant	shift 50% of lumens, early penetration	for Ceiling, Suspended, Kitchen
Appl: Ceiling Recessed, Kitchen	Fixt: Ceiling, Recessed, Cans	shift all lumens, early penetration	for Ceiling, Recessed, Kitchen

Notes: This scenario only applies to kitchen fixtures.

5.4.6 N5: Efficient Bath Vanities

Scenario Title:	Change bathroom vanity lighting from incandescent to fluorescent	ID: N5
Scenario Description:	New construction. Increase penetration of fluorescent lamps, with corresponding decrease in incandescents, for bathroom vanity fixtures. Late penetration	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Wall, Vanity	Incand 1-50 W	shift all lumens; late penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
	Incand 101-150 W	ditto	to Fluor 30+ W

Notes: This scenario only applies to bathroom wall fixtures.

5.4.7 N6: Efficient Garage and Utility Fixtures and Controls

Scenario Title:	Garage and Utility Fluorescents	ID: N6
Scenario Description:	Assume Title 24 requires high efficiency lighting in garages and utility rooms in residential new construction, such that all installed light fixtures must either have a dedicated socket requiring a lamp with efficacy of 30L/W or higher, or a motion detector or timing control .	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	12/9/96

create new control type, Utility Control, which reduces hours of operation to 85% of on-off base.

Create new utility fixture types, for each fixture type that exists within garage and utility rooms. These fixtures are assigned 0% incandescent, tungsten-halogen, and other lighting, with the remaining fluorescent lamp types filling all the market shares.

These new utility fixtures will acquire 75% of the overall market share, in the same proportion as the old fixture types. Thus, wall mounted fixtures in utility rooms might have 10% of market share in the base case. In this scenario, the new utility wall mounted will move to 7.5% market share, and the original wall mounted will move to 2.5%. This effectively increases market share of fluorescent lighting by that additional 75%.

Rooms: Garage and Utility	All fixture types (effectively)	incandescent market shares reduce 75%	in favor of CFL or FFL
Rooms: Garage and Utility	on-off switches	reduce market share 25%	in favor of new "Utility Control"

5.4.8 T1: Energy Star Outdoor Lighting

Scenario Title:	EPA Energy Star Outdoor Lighting	ID: T1
Scenario Description:	For total buildings. Wall or ceiling mounted outdoor fixtures. Increase market share of fluorescent lamp types at expense of incandescents. Also, reduce average hours of operation for switched fixtures (those with long hours of operation) through use of motion detectors.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Outdoor, Ceiling, Porch	Inc 1-50 W	reduce lumen share by 50%; straight line	for Fluor 1-19 W
	Inc 51-100 W	ditto	for Fluor 20-30 W
	Inc 101-150 W	ditto	for Fluor 31+ W
Outdoor Wall, Flood	Inc 101-150 W	ditto	for Fluor 31+ W
Outdoor, Wall, Lantern	Inc 1-50 W	ditto	for Fluor 1-19 W
	Inc 51-100 W	ditto	for Fluor 20-30 W
Create new control:	On/Off to MD (Motion Detector)	Reduce hours of op. to 10% of On/Off base	Note: Assume high usage On/Off (10+ hrs/day) are cut back 90% to 1 hr/day)
All Other, Yard	Simple On/Off	Reduce share by 10%; straight line	for On/Off to MD
Ceiling, Yard	ditto	ditto	ditto
Wall Mounted, Yard	ditto	ditto	ditto

Notes: Incandescents larger than 150 W only occur in insignificant quantities, and so are neglected in this scenario. HID lamps are all lumped together in the "Outdoor, Wall, Barn" fixture type, and are left unchanged here. Approximately 17% of outdoor switched fixtures are on 10+ hours/day; assume 2/3 of these are converted to MD.

5.4.9 T2: CFL Torchiers

Scenario Title:	Improve torchieres with CFLs	ID: T2
Scenario Description:	For all buildings. Replace incandescent and halogen lamps in torchieres with compact fluorescent lamps. Late penetration to 80%	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Create new fixture type:	Floor lamp, Torchiere	with 2 lamps. CFL 20-30 W.	Assume more efficacious source
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Floor lamp, Torchier	Fluor 20-30 W	increase lumens to 80%; late penetration	Incand. & halogen shrink proportionally
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Notes: Scenario does not assume any change in penetration of torchiers in living rooms or bedrooms.

5.4.10 T3: CFL Floor and Table Lamps

Scenario Title:	Improve all large floor and table lamps with CFLs	ID: T3
Scenario Description:	For all buildings. Replace incandescent and halogen lamps in torchieres with compact fluorescent lamps. Also replace incandescents in table and floor lamps with CFLs. Late penetration to 80%	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Create new fixture type:	Floor lamp, Torchiere	2 lamps. CFL 20-30 W.	Assume more efficacious source
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Floor lamp, Torchier	Fluor 20-30 W	increase lumens to 80%; late penetration	Incand. & halogen shrink proportionally
Floor lamp, Traditional	Incand 51-100 W	decrease lumens to 20%; late penetration	for Fluor 20-30 W
Table Lamp, Large	Incand 51-100 W	decrease lumens to 20%; late penetration	for Fluor 20-30 W

Notes: Scenario does not assume any change in penetration of torchiers in living rooms or bedrooms. Floor lamps, Task and Table lamps, Small are not affected. Incandescents in other table and floor lamps are affected.

5.4.11 T4: Time Limiters

Scenario Title:	Time limiting controls for hard-wired fixtures	ID: T4
Scenario Description:	All buildings. Install time controllers on hard-wired fixtures that automatically turn off lights after a pre-set time. Late penetration curve.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	12/9/96

Create new control type:	Time limiter	Reduce average hours of op. to 90% of On/Off base	Note: Assume all switched fixtures affected and effect is averaged
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All fixture types except floor lamps and table lamps	Simple On/Off	Reduce 80% toward zero share	for Time limiter - increase by amount On/Off decreased
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Notes: Assumes either lamps, socket inserts, or wall switches with built-in time limiting ability.
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5.4.12 T6: CFLs Everywhere

Scenario Title:	Increase use of compact fluorescents versus incandescents in all applications	ID: T6
Scenario Description:	All buildings. Decrease penetration of incandescents 75% of the way toward zero in all applications; correspondingly increase share of fluorescents in these applications	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	5/19/99

All fixture types	Incand 1-50 W	shift 75% of lumens; late penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
	Incand 101-150 W	ditto	to Fluor 30+ W

Notes: This scenario applies to all fixture types.

5.4.13 T6p: CFLs Everywhere, Parametrics

Scenario Title:	Increase use of compact fluorescents versus incandescents in all applications. Study sensitivity of variables.	ID: T6 parametrics see notes
Scenario Description:	All buildings. Decrease penetration of incandescents 75*% of the way toward zero in all applications; correspondingly increase share of fluorescents in these applications	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	5/19/99

All fixture types	Incand 1-50 W	shift 75*% of lumens; late penetration	to Fluor 1-19 W
	Incand 51-100 W	ditto	for Fluor 20-30 W
	Incand 101-150 W	ditto	to Fluor 30+ W

Notes: Run the original *75% penetration with s.) straight line, e.) early, l.) late and c.) classic penetration. Run l.) late penetration with 2.) 25% lumen shift, 5.) 50% lumen shift, 7.) 75% lumen shift. Label results T6-s.7, T6-e.7, T6-l.7, T6-c.7, T6-l.5, T6-l.2.

5.4.14 T7: Increase Use of Halogen Torchiers

Scenario Title:	Bad torchier scenario	ID: T7
Scenario Description:	All buildings. Increase share of floor lamps that are halogen torchiers; then increase living room fixtures from table lamps to torchiers	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	5/19/99

Application: Floor lamp, Living	Floor lamp, Traditional	shift 50% of existing share; late penetration	to Floor lamp Torchier
Room type: Living	Table Lamp, Living	shift 50% of existing share; late penetration	to Floor Lamp, Living

Notes: Assumes increasing popularity of torchiers over table lamps and traditional floor lamps

5.4.15 T7a: Increase Use of Halogen Torchiers, Double Penetration

Scenario Title:	Bad torchier scenario, double penetration	ID: T7a
Scenario Description:	All buildings. Increase share of floor lamps that are halogen torchiers; then increase living room fixtures from table lamps to torchiers. Double number of floor lamps in living rooms and bedrooms.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	5/19/99

Room: Living Room	Floor Lamps	double number of floor lamps per living room, from .28 to .56	
Room: Bedroom	Floor Lamps	double number of floor lamps per bedroom, from .12 to .24	
Application: Floor lamp, Living	Floor lamp, Traditional	shift 50% of existing share; late penetration	to Floor lamp Torchier
Room type: Living	Table Lamp, Living	shift 50% of existing share; late penetration	to Floor Lamp, Living

Notes: Assumes increasing popularity of torchiers over table lamps and traditional floor lamps. Assumes that because of low cost and wide availability, the number of floor lamps per household increases, to 2x the baseline.

5.4.16 T7b: Increase Use of Halogen Torchiers, Quadruple Penetration

Scenario Title:	Bad torchier scenario, quadruple penetration	ID: T7b
Scenario Description:	All buildings. Increase share of floor lamps that are halogen torchiers; then increase living room fixtures from table lamps to torchiers. Quadruple number of floor lamps in living rooms and bedrooms.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/DEM	5/19/99

Room: Living Room	Floor Lamps	double number of floor lamps per living room, from .28 to 1.12	
Room: Bedroom	Floor Lamps	double number of floor lamps per bedroom, from .12 to .48	
Application: Floor lamp, Living	Floor lamp, Traditional	shift 50% of existing share; late penetration	to Floor lamp Torchier
Room type: Living	Table Lamp, Living	shift 50% of existing share; late penetration	to Floor Lamp, Living

Notes: Assumes increasing popularity of torchiers over table lamps and traditional floor lamps. Assumes that because of low cost and wide availability, the number of floor lamps per household increases dramatically, to 4x the baseline.

5.4.17 T8: HIR in 3+ Hr. Fixtures

Scenario Title:	HIR Incandescents	ID: T8
Scenario Description:	A new Incandescent lamp is assumed to take over the market for standard incandescent lamps that are operated for 3 hours or more per day. Market shares by fixture types are based on average hours of operation for that fixture type.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	12/9/96

Create new HIR incandescent		at 22 lumens/watt	
Fixture type:	Avg. Hours of operation per day, FYI	all incandescent market shares reduced by	in favor of new HIR
Ceiling Recessed Cans	2.04	20%	
Ceiling Surface Decor/Util	1.97	20%	
Ceiling Surface Kitchen	3.95	75%	
Ceiling Surface Track	2.69	40%	
Ceiling Suspended Pendant	2.18	20%	
Ceiling Suspended Chand.	2.42	30%	
Wall Mounted Sconce	1.94	15%	
Wall Mounted Vanity	2.42	30%	
Undercabinet Kitchen	2.32	20%	
Table Lamp Small	1.61	15%	
Table lamp Large	1.99	20%	
Floor Lamp Torchier	2.31	20%	
Floor lamp Traditional	2.30	20%	
Floor Lamp Task	2.18	20%	
Other Indoor	2.32	20%	
Outdoor Ceiling	3.10	50%	
Outdoor Wall Flood	2.06	20%	
Outdoor Wall Lantern	2.97	50%	
Other Outdoor	5.16	75%	
NOTES: less than 1.67=10%, to 1.9=15%, to 2.33=20%, to 2.67=30%, to 2.9=40%, to 3.5=50%, above =75%			

5.4.18 T9: CFLs in 3+ hr. Fixtures

Scenario Title:	HIR - CFL comparison	ID: T9
Scenario Description:	The same scenario as T8, except that CFLs replace the incandescents instead of HIRs, for comparison purposes	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	12/9/96

Use appropriate sized CFLs for incandescent replacements. See scenarios T3 and N3.			
Fixture type:	Avg. Hours of operation per day, FYI	all incandescent market shares reduced by	in favor of CFLs
Ceiling Recessed Cans	2.04	20%	
Ceiling Surface Decor/Util	1.97	20%	
Ceiling Surface Kitchen	3.95	75%	
Ceiling Surface Track	2.69	40%	
Ceiling Suspended Pendant	2.18	20%	
Ceiling Suspended Chand.	2.42	30%	
Wall Mounted Sconce	1.94	15%	
Wall Mounted Vanity	2.42	30%	
Undercabinet Kitchen	2.32	20%	
Table Lamp Small	1.61	15%	
Table lamp Large	1.99	20%	
Floor Lamp Torchier	2.31	20%	
Floor lamp Traditional	2.30	20%	
Floor Lamp Task	2.18	20%	
Other Indoor	2.32	20%	
Outdoor Ceiling	3.10	50%	
Outdoor Wall Flood	2.06	20%	
Outdoor Wall Lantern	2.97	50%	
Other Outdoor	5.16	75%	

less than 1.67=10%, to 1.9=15%, to 2.33=20%, to 2.67=30%, to 2.9=40%, to 3.5=50%, above =75%

5.5 Appendix E: Commercial Scenario Specifications

5.5.1 cN1, Improve Design Standards

Scenario Title:	Improve Design Standards	ID:cN1
Scenario Description:	For new construction. Assume that designers are trained to use more efficient luminaires, more efficient layouts, and more efficient overall design strategies. The target mean lumen output level for each space is reduced by 10%	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Application	Lumen Level	changes	in relation to:
All Space-Bldg links	all lumen levels	multiply by .9, classic penetration	

Notes: This scenario assumes that resulting light levels will remain the same, but that more efficient luminaires and design can produce those levels with lower raw mean lumen output per space.

5.5.2 cN2, Improve Maintenance Practices

Scenario Title:	Improve Maintenance Practices	ID:cN2
Scenario Description:	For new construction. Assume that information about lumen maintenance and maintenance practices becomes more accurate, so that designers can design with more precision. Assume that owners and managers are educated about the importance of routine maintenance, and reliably improve their practices.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Application	Lamp/Ballast	changes	in relation to:
All Space-Bldg links	all lumen levels	reduce to .95, classic penetration	

Notes: This scenario is similar to reducing the safety factor in engineering design by reducing the risk of poor maintenance, and reducing the uncertainly level of information used in the design process. It does not result in any changes in design illumination for spaces, but may reduce the initial illumination levels, and average maintained levels towards more conservative values.

5.5.3 cN3, Skylights

Scenario Title:	Skylights	ID:cN3
Scenario Description:	For new construction. Assume sky lighting increases to 50% of new construction, with photo controls also adding lumen maintenance savings.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Application	Lamp/Ballast	changes	in relation to:
Time correction factor create new photo control	photo controls	create photo control time correction factor of .75	
controls market share for all spaces except cook, public, lodging,	on off switches	decrease by 50%, late penetration	photo controls (new) increase

Notes: 90% of California buildings are 1 story and an additional 5% are two story. Assume that an education campaign teaches owners and architects to install skylights in 50% of new construction SF. Use late penetration to allow time for education campaign. Time correction factor increases to .67 because controls are now aggressively applied, taking full advantage of opportunities. Be sure to use new photo control with 75% time correction factor

5.5.4 cN5, Unconditioned Space included in T-24

Scenario Title:	Unconditioned Space included in T-24	ID:cN5
Scenario Description:	For new construction. All unconditioned space goes to Title 24 levels	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Context	Field	changes	in relation to:
Storage-Unconditioned and Miscellaneous-Unconditioned	Lumens/SF	goes to .9 of existing, classic penetration	
			all others

Notes: Currently, storage-unconditioned is at .54 W/SF and misc-unconditioned is at .9 W/SF. T-24 recommendations based on IES illuminance categories vary from .4 to 1.2 W/SF for illuminance categories B-D for large room cavity spaces. Currently storage-U is 15% FFL1, 26% FFL2, & 54% HID2, misc-U is 28% FFL1, 28% FFL2, and 42% HID2. Thus, these are generally quite efficient and there is not a lot of room for improvement.

5.5.5 cN6: Extreme case: Outlaw incandescent lamps in commercial buildings

Scenario Title:	Outlaw incandescent lamps	ID:cN6
Scenario Description:	Extreme conditions: Assume Title 24 outlaws use of all incandescent lamps in commercial buildings. Gives us a extreme case yard stick to measure other scenarios.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

All space types	INC 1	reduces to 0 market share	in favor of CFL1
All space types	INC 2	reduces to 0 market share	in favor of CFL2
All space types	INC 3	reduces to 0 market share	in favor of HID1
		all early penetration	

Notes:

5.5.6 cN7: 90% T-24 levels

Scenario Title:	Decrease T-24 levels to 90% of current	ID: cN7
Scenario Description:	Area category method allowed lighting power is reduced to 90% of current levels. Use classic penetration throughout.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Space:		Analysis Results		New Target
		W/SF	L/SF	L/SF
1	OFF	1.51	81.2	77.4
2	HALL	1.8	84.5	58.1
3	RET	1.94	101.3	101.0
4	DINE	1.39	58.8	45.7
5	COOK	1.85	95.6	102.3
6	TECH	1.42	79.0	90.1
7	CLAS	1.82	110.3	109.0
8	PUB	1.47	55.7	64.2
9	LODG	2.12	42.5	38.3
10	STOR-C	1.07	63.4	32.0
11	STOR-U	0.54	33.9	33.9
12	IND	1.13	72.6	88.7
13	MISC-C	1.22	58.5	56.1
14	MISC-U	0.9	59.9	77.8

Notes: Substitute non shaded "New target L/SF by space type. These represent 90% of current T-24 levels expressed in L/SF using the same efficacy as the analysis. Shaded cells represent space types where there would not be a reduction in energy use by using the 90% T-24 targets.

5.5.7 cN8: 80% T-24 levels

Scenario Title:	Decrease T-24 levels to 80% of current	ID: cN8
Scenario Description:	Area category method allowed lighting power is reduced to 80% of current levels. Use classic penetration throughout.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Space:		Analysis Results		New Target
		W/SF	L/SF	80% L/SF
1	OFF	1.51	81.2	68.8
2	HALL	1.8	84.5	51.6
3	RET	1.94	101.3	89.8
4	DINE	1.39	58.8	40.6
5	COOK	1.85	95.6	90.9
6	TECH	1.42	79.0	80.1
7	CLAS	1.82	110.3	96.9
8	PUB	1.47	55.7	57.1
9	LODG	2.12	42.5	34.0
10	STOR-C	1.07	63.4	28.4
11	STOR-U	0.54	33.9	30.1
12	IND	1.13	72.6	78.8
13	MISC-C	1.22	58.5	49.8
14	MISC-U	0.9	59.9	69.2

Notes: Substitute non shaded "New target L/SF by space type. These represent 80% of current T-24 levels expressed in L/SF using the same efficacy as the analysis. Shaded cells represent space types where there would not be a reduction in energy use by using the 80% T-24 targets.

5.5.8 cPN1, T-8/ Electronic ballasts

Scenario Title:	T-8/Electronic Ballasts	ID:cPN1
Scenario Description:	For new construction. T-8 lamps and electronic ballasts take over the new construction market place.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Context	Lamp/Ballast	changes	in relation to:
FFL1 and FFL2 technology group	electronic ballasts	goes to 100% market share, early penetration	all others
FFL1 ELC, FFL2 ELC ballast type	FL 32W ELC	goes to 100% market share, early penetration	all others

Notes:

5.5.9 cPN2, Lumen Maintenance

Scenario Title:	Lumen maintenance	ID:cPN2
Scenario Description:	For new construction. Dimming ballasts and lumen maintenance photo controls are applied to 50% of new construction using fluorescent lamps.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	P1 (or include P1 in this scenario)	
Specifier / Date	HMG/LLH	5/19/99

Context	Technology	changes	in relation to:
FFL1 and FFL2	dimming ballasts	goes to 50% market share, early penetration	electronic ballasts
FFL1 ELC, FFL2 ELC	lumen maint control (new)	goes to 50% market share, early penetration	all others
Create lumen maintenance control with .95 power correction factor at ballast level			

Notes: Once T-8 lamps are ubiquitous with their 90% lumen maintenance, photo controls can only save ½ of that depreciation, hence a 95% power reduction factor.

5.5.10 cN9: New Technology Standard for Title 24

Scenario Title:	New Technology Standard for Title 24	ID: cN9
Scenario Description:	Derive new watts/SF values for Title 24 areas method compliance levels, based on full penetration of T8-elc, CFL-elc, and Halogen IR lamp-ballast technologies.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Define new lamp Halogen IR	@ 20 lumens/watt		
Technology:	Ballast:		
FFL1	FFL1 ELC	goes to 100%	at expense of
FFL2	FFL2 ELC	goes to 100%	all others
CFL1 & CFL2	CLF ELC	goes to 100%	classic
Ballast:	Lamp:		penetration
FFL1 ELC	32W - ELC	goes to 100%	throughout
FFL2 ELC	41-95W ELC	goes to 100%	
All Incand	Halogen IR	goes to 100%	

Notes: For this scenario, we would like to see resulting W/SF at space type and building type at full penetration, in addition to energy savings. These W/SF values will assess LPD levels possible with current technology, similar to way that the original T-24 area method allowances were calculated using T-12s with mag-ee ballasts, etc.

5.5.11 cPN10 Maximum Efficacy

Scenario Title:	Maximum Efficacy	ID: cPN10
Scenario Description:	All lamp/ballast technologies are converted to the most efficacious option in the foreseeable future. This scenario basically combines cN9, cT2, cT3, and forms the basis for other additive scenarios. Classic penetration throughout.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

first, Define new lamp Halogen IR (per cN9)	@ 20 lumens/watt		
Technology:	Ballast:	in favor of:	
FFL1	FFL1 ELC	goes to 100%	at expense of
FFL2	FFL2 ELC	goes to 100%	all others
CFL1 & CFL2	CLF ELC	goes to 100%	"
HID1 - Technology	HID STD ballasts	reduce to 50%	in favor of HID HE
HID2 - Technology	HID STD ballasts	reduce to 50%	in favor of HID HE
HID STD - ballasts	LPS and MV	go to 0.1%	HPS 151+W STD
Ballast:	Lamp:		
FFL1 ELC	32W - ELC	goes to 100%	
FFL2 ELC	41-95W ELC	goes to 100%	
Application:	Technology:		
In Retail, Dine, and Pub	INC 1	reduces to 50%	in favor of CFL1
In Retail, Dine, and Pub	INC 2	reduces to 50%	in favor of CFL2
In all other applications	INC 1	reduces by 90%	in favor of CFL1
In all other applications	INC 2	reduces by 90%	in favor of CFL2
In all applications	INC3	reduces to 0%	in favor of HID1
Ballast	Lamp		
Finally, INC	all remaining INCs	reduces to 0%	Halogen IR

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5.5.12 cPN11 Maximum Efficacy w/ Improved Design

Scenario Title:	Maximum Efficacy w/ Improved Design	ID: cPN11
Scenario Description:	All of changes of cPN10 are included, plus it is assumed that designers learn to use more efficacious fixtures and design strategies so that mean lumen output can be reduced on average by 10% (as per cN1)	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Progressive, from cPN10	
Specifier / Date	HMG/LLH	5/19/99

All Space-Bldg links	all lumen levels	multiply by .9,	classic penetration

5.5.13 cPN12 Maximum Efficacy w/ Improved Design and Controls

Scenario Title:	Maximum Efficacy w/ Design and Occupancy Controls	ID: cPN12
Scenario Description:	All of the changes from cPN11 are included, plus it is assumed that half of all spaces controlled with on-off switches in the base case are fitted with occupancy sensors.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Progressive, from cPN11	
Specifier / Date	HMG/LLH	5/19/99

Application	Control	changes	in relation to:
All space types, except retail.	On-Off Switches	decrease by 50%, classic penetration	Sensors (new per T1) increase, all others remain the same
Define New Motion Sensor with Time Correction Factors by space type per original memo (as in T1)		with Time Correction Factors per original memo	

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5.5.14 cPN13 Maximum Efficacy w/ Improved Design, Controls & Skylights

Scenario Title:	Maximum Efficacy w/ all	ID: cPN13
Scenario Description:	all of the conditions of cPN12 are included, plus it is assumed that 50% of new construction (the 50% of remaining on-off controls) has skylighting and dimming ballasts that allow lumen maintenance also.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Application	Lamp/Ballast	changes	in relation to:
Time correction factor create new photo control (per cN3)	photo controls	create photo control time correction factor of .75	
market share for controls for all spaces except cook, public, lodging,	on off switches	decrease by 100%, classic penetration	photo controls (new) increase

Note: On-off switches had already been decreased by 50% in the previous scenario cPN12, therefore this is equivalent to another 50% on on-off switches.

5.5.15 cN14 ASHRAE 90.1r

Scenario Title:	ASHRAE 901.r LPD Standards	ID:cN14
Scenario Description:	Apply proposed new ASHRAE/IESNA 90.1r LPD standards to California buildings. The proposed ASHRAE LPDs were converted to equivalent lumen/SF targets using the average efficacy for lamp/ballasts observed in the data sample.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Space type	Lumen/SF Target		
Office	70		
Hall	40		
Retail	119		
Dining	56		
Cooking	130		
Technical	89		
Classroom	88		
Public	79		
Lodging	29		
Storage-C	70		
Storage-U	34		
Industrial	61		
Misc.-C	58		
Misc.-U	60		

Notes: the conversion table, which weighted various ASHRAE space types to create an equivalent space type for the model, and translated W/SF into L/SF is attached.

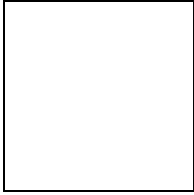


Figure 5-10 - ASHRAE/IESNA 901.R Lighting Power Densities Calculation

5.5.16 cN15 ASHRAE 90.1r w/ Controls

Scenario Title:	ASHRAE 90.1r LPD& Control Standards	ID:cN15
Scenario Description:	Apply proposed new ASHRAE/IESNA 90.1r LPD and control standards to California buildings. It is not clear how the ASHRAE control standards would be applied in California buildings, some of which already have controls, or the resulting savings. For lack of better information, a 10% controls reduction was applied throughout.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Space type	Lumen/SF Target	control factor	
Office	70	.9	
Hall	40	.9	
Retail	119	.9	
Dining	56	.9	
Cooking	130	.9	
Technical	89	.9	
Classroom	88	.9	
Public	79	.9	
Lodging	29	.9	
Storage-C	70	.9	
Storage-U	34	.9	
Industrial	61	.9	
Misc.-C	58	.9	
Misc.-U	60	.9	

Notes: the conversion table, which weighted various ASHRAE space types to create an equivalent space type for the model, and translated W/SF into L/SF is attached.

5.5.17 cN16 Title 24 Standard

Scenario Title:	Title 24 Standard	ID:cN16
Scenario Description:	Apply existing Title 24 LPD requirements to the CA building stock in the model. The Title 24 maximum LPD requirements were converted to equivalent lumen/SF targets using the average efficacy for lamp/ballasts observed in the data sample.	
Scenario Type	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Space type	Lumen/SF Target		
Office	86		
Hall	65		
Retail	112		
Dining	51		
Cooking	114		
Technical	100		
Classroom	121		
Public	71		
Lodging	43		
Storage-C	36		
Storage-U	34		
Industrial	99		
Miscall-C	62		
Misc.-U	60		

Notes: the conversion table, which weighted various Title 24 space types to create an equivalent space type for the model, and translated W/SF into L/SF is attached.

Analysis #	Analysis Space:	Analysis Results W/SF	Analysis Results L/SF	Average Efficacy	Comparable T-24 space types	T-24 W/SF	T-24 Avg. W/SF	lumens/sf	T24 scenario L/SF
1	OFF	1.51	81.2	53.75	Office	1.6	1.6	86.0	86.0
					Conf, Meeting	1.6			
2	HALL	1.80	84.5	46.92	Corr, Rest, Support	0.8	1.4	64.5	64.5
					Hotel Lobby	2.3			
					Main Entry Lobby	1.6			
3	RET	1.94	101.3	52.22	Retail, Wholesale	2.2	2.15	112.3	112.3
					Grocery	2.0			
4	DINE	1.39	58.8	42.27	Dining	1.2	1.2	50.7	50.7
5	COOK	1.85	95.6	51.66	Kitchen	2.2	2.2	113.7	113.7
6	TECH	1.42	79.0	55.64	Med. Care	1.8	1.8	100.2	100.2
7	CLAS	1.82	110.3	60.58	Classroom	2.0	2.0	121.2	121.2
8	PUB	1.47	55.7	37.87	Auditorium	2.0	1.9	71.3	71.3
					Exhibit	2.3			
					Hotel Funct	2.3			
					Religious	2.2			
					Motion Pict.	1.0			
					Performance	1.5			
9	LODG	2.12	42.5	20.05	Non T-24, per exist lodging	2.1	2.1	42.5	42.5
10	STOR-C	1.07	63.4	59.24	Ind. & Com Storage	0.6	0.6	35.5	35.5
11	STOR-U	0.54	33.9	62.69	Non T-24, per conditioned	0.6	0.6	37.6	33.9
12	IND	1.13	72.6	64.27	Gen. Com & Indust. Work	1.3	1.5	98.6	98.6
					Precision Work	2.0			
13	MISC-C	1.22	58.5	47.93	Gen. Com & Indust. Work	1.3	1.3	62.3	62.3
14	MISC-U	0.9	59.9	66.50	Non T-24, per conditioned	1.3	1.3	86.5	59.9

Title 24 scenario sets Lumens/SF target to lumens generated from weighted T-24 LPD targets, using average observed efficacy for the LPD to L/SF conversion.

KEY: Lumens per SF based on analysis results since Title 24 does not apply to these space types

Figure 5-11 - Title 24 Standards Lighting Power Densities Calculation

5.5.18 cT1, Occupancy Sensors, Market

Scenario Title:	Occupancy Sensors, Market	ID:cT1
Scenario Description:	For all buildings. Assume dramatic increase in occupancy sensors, at the expense of on-off switches.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Application	Control	changes	in relation to:
All space types, except retail.	On-Off Switches	decrease by 50%, straight line penetration	Sensors (new) increase, all others remain the same
Define New Motion Sensor with Time Correction Factors by space type per original memo		with Time Correction Factors per original memo	

Notes: Assume that half of all spaces currently using on-off switches could be retrofitted with occupancy sensors. Be sure to use newly created motion sensor control type.

5.5.19 cT2: High Efficiency HID and HPS

Scenario Title:	High Efficiency HID and HPS	ID: cT2
Scenario Description:	Increase penetration of HE Metal Halide ballasts at expense of standard metal halide, and increase penetration of HPS lamps at expense of MV and LPS	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Context			
HID1 - Technology	HID STD ballasts	reduce to 50% lumen share, late penetration	in favor of HID HE ballasts
HID2 - Technology	HID STD ballasts	reduce to 50% lumen share, late penetration	in favor of HID HE ballasts
HID STD - ballasts	LPS and MV	go to 0.1% lumen share, straight line penetration	in favor of HPS 151+W STD

Notes: This scenario assumes that there are near future improvements in High Efficiency HID ballasts that make them more cost effective and appropriate to at least half of current HID applications. In addition, the remaining 0.3% lumen share of LPS and 7.4% share of MV transitions to HPS.

5.5.20 cT3: Compact Fluorescent Full Penetration

Scenario Title:	Compact Fluorescent Full Penetration	ID: cT3
Scenario Description:	Compact fluorescents take over the current market for small and medium incandescent lamps in commercial applications.	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

In Retail, Dine, and Pub	INC 1	reduces to 50% of current lumen share	in favor of CFL1
In Retail, Dine, and Pub	INC 2	reduces to 50% of current lumen share	in favor of CFL2
In all other applications	INC 1	reduces by 90% of current lumen share	in favor of CFL1
In all other applications	INC 2	reduces by 90% of current lumen share	in favor of CFL2
		all straight line penetration	

Notes: The assumption is that there are more applications that benefit from incandescent attributes in retail, dining, and public spaces, thus only 50% of lumens are replaced in those space types, where as in all other space types incandescent is reduce to only 10% of current shares.

5.5.21 cT4: Halogen IR Full Penetration

Scenario Title:	Halogen IR Full Penetration	ID: cT4
Scenario Description:	Halogen IR reflecting lamps take over the current market for almost all existing incandescent and halogen lamps in commercial applications. Late Penetration	
Scenario Type	<input type="checkbox"/> New Construction	<input checked="" type="checkbox"/> Total Buildings
Base Case Scenario	Standard	
Specifier / Date	HMG/LLH	5/19/99

Create HIR 1			at 22 lumens watt
Create HIR 2			at 25 lumens/watt
In Retail, Dine, and Pub	INC 1 & 2, & H1	reduces to 90% of current lumen share	in favor of HIR 1
In Retail, Dine, and Pub	INC 3 & 4, & H2	reduces to 90% of current lumen share	in favor of HIR 2
In all other applications	INC 1 & 2, & H1	reduces by 90% of current lumen share	in favor of HIR 1
In all other applications	INC 3 & 4, & H2	reduces by 90% of current lumen share	in favor of HIR 2

Notes: The assumption is that Halogen IR technology becomes a cost effective retrofit replacement for existing incandescent lamps and halogen lamps in all space types, with 90% market share in 15 years. The exception is 10% of these lamps which may be operated for very short hours (less than 3 hrs day), thus, because they are not cost effective or for some other reason, remain with the current incandescent or halogen technology. Late penetration.

	Incandescent	L/W	HIR	L/W
1. 1-50W incand.		11	HIR1	22
2. 51-100W incand.		14	HIR1	22
3. 101-150W incand		14	HIR 2	25
4. 151+W incand		17	HIR 2	25
5. 1-150 W T-H		15	HIR 1	22
6. 151-249 W T-H		15	HIR 2	25